HISTORY OF

DENTISTRY

A PRACTICAL TREATISE FOR THE USE OF DENTAL STUDENTS AND PRACTITIONERS

BY

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Illustrated with 42 Engravings

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TO

DR. WILLIAM H. TRUEMAN

WHOSE RESEARCHES INTO DENTAL HISTORY

HAVE VASTLY ENRICHED OUR LITERATURE IN THAT FIELD

THIS VOLUME

IS RESPECTFULLY DEDICATED

PREFACE.

THE author makes no claim to originality in regard to the text-matter of this work other than the manner of its presentation. The substance of the text is largely derived from the writings of Guerini, Koch and Thorpe, supplemented by articles in current dental magazines. Much valuable information has also been furnished by the deans of several dental colleges and the secretaries of dental associations, societies and fraternities.

Acknowledgment is made to Col. Robert T. Oliver, Dental Corps, U. S. Army; Dr. Otto U. King, Dr. Edward C. Kirk and Dr. Frank J. Stockman for valuable aid. Particular credit is due my good friend Dr. William H. Trueman, of Philadelphia, for his valuable help in revising the manuscript.

While a résumé of ancient dentistry is included in the first part of this work, it has been prepared with special reference to the advent and development of dentistry in the United States. In this manner the text has been so condensed as to place in the hands of the student and practitioner of dentistry only such facts as should form a necessary part of their education. Such historical works as have been published in the past have either been so voluminous as to be unsuited to the needs of the busy and overtaxed student and practitioner, or they have been confined to special subjects or periods, or to small pamphlets used for advertising purposes.

This much neglected subject has become a part of the curriculum of our dental schools, and thus there is created a new interest in the struggles of our professional forefathers. A fuller understanding of their difficulties and achievements should inspire us with renewed energy and zeal as we view our present discouragements in the light of future possibilities.

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HISTORY OF DENTISTRY.

INTRODUCTION.

THAT dentistry in some form has been practised from the most ancient times, there seems to be but little doubt, since considerable fragmentary evidence still exists as to the general methods used by the ancients. If we stop to inquire who first extracted teeth, made plates or filled carious cavities we shall find that all such information is shrouded in the mists of antiquity along with the history of the pyramids and other relics of early civilization.

It should be understood that much that is attributed to ancient writers is more or less uncertain, each writer compiling that which had been written before him and adding thereto his own views. For this reason much confusion exists in regard to the exact source of certain historical data. The Arabians collected considerable medical literature in the early days, and most of the early medical writings were based on their work. In this way, early medical history has become "accepted history" rather than reliable or authentic history.

Dentistry, as a part of the medical art, was first practised by the priests as a sort of religious rite, but later material remedies were added to aid in effecting cures and help maintain the prestige of the priesthood. Later the laity became interested, and surgery, including dentistry, was for a long period practised by barbers and travelling charlatans, who resorted to music and various other forms of entertainment to attract the people. Finally, a few of the more far-seeing medical and dental practitioners became convinced of the necessity for better educated men to practise this important

specialty, and thus dentistry gradually rose from about the beginning of the sixteenth century from a desultory trade or calling to the dignity of a learned profession. However, not until the latter half of the nineteenth century and the first part of the present century did it really make rapid progress. It is a notable fact that many worthy dentists of modern times began their career in the laboratory or office of older practitioners. Later, however, they added to this training such scientific knowledge as was obtainable at the time and reached an honorable position among professional men. Not until 1840 was a dental college organized to teach systematically the theory and practice of dental surgery. This, the Baltimore College of Dental Surgery, was chartered February 1, 1840, opened in that year, and is still in existence.

Perhaps it is within the last twenty years that the greatest progress has been made by this young profession, during which time Dr. Black introduced scientific cavity preparation and a balanced alloy, Drs. Callahan, Rhein, Best and others gave us scientific root-canal work, and Dr. Taggart perfected and introduced the gold inlay, while silicate fillings have come to occupy an important place in operative work, and the roentgen ray has become an indispensable aid in diagnosing pathological conditions. In 1910 Dr. William Hunter, of London, contributed his celebrated paper on the "Relation between Oral Infection and Systemic Disease," and woke the dental profession to its responsibilities. Oral prophylaxis has progressed to a point where unclean mouths are no longer tolerated, and the prosthesist has come to our aid with removable bridge-work and more scientific methods of denture-making.

In the text which follows, an attempt will be made to cover briefly the most interesting and important steps in dental progress with which it is believed every practitioner should be familiar.

CHAPTER I.

ANCIENT DENTISTRY.

In order to study intelligently the history of any great movement it is necessary to go back to the beginning of that movement and study the causes of its being and the phases of its evolution. The child, when born, first breathes and cries, then laughs, talks, crawls, walks and finally grows into the full strength of manhood. All of this requires much patient nurture and training, and not a few bruises, heart-aches and knocks. So it is with the birth and growth of a profession; it must have its inception, its period of infancy or comparative helplessness, its period of development and growth, its opposition and discouragements, and finally its period of sane and conservative development when empirical ideas and rash experiments are cast aside.

It often happens that the origin of a profession antedates any literature relating thereto. In such cases tradition and prehistoric relics obtained from tombs and ruins of ancient cities form the best available data.

In the words of a distinguished writer, "To know the history of a profession is to know the profession itself." It has also been said, "There is nothing new under the sun;" but be that as it may, it is a fact that much that is considered new in medicine, dentistry and surgery was known to Hippocrates, Fauchard, Galen and Paré.

Sacerdotal Medicine, which was practised in remote times by the priesthood, was mostly derived from the false notion prevalent among primitive peoples that the afflicted person had been stricken by the wrath of some divinity. The priests were always ready to treat such cases, as they were well paid, and if the person recovered, their prestige was considerably increased, while if the patient did not improve

it was because the supposed offender was not worthy of receiving the desired pardon.

The first *physician* of record was *I-Em-Hetep* ("He who cometh in peace"), who lived in the reign of King Tosher of the Third Dynasty of Egypt, about 4000 B.C. He was evidently a man of great prominence, since the Egyptians constructed a pyramid at Sakkra in his honor, and as many

FIG. 1.—Part of Ebers' papyrus in Egyptian hieratic characters containing eleven dental prescriptions.

statuary likenesses of him have been found, it is evident that after his death he was worshipped as the Egyptian God of Medicine. That the early Egyptian surgeons had to use great skill in the treatment of disease is proven by the oldest book in existence, called *The Instruction of Ptah-Hotep*. Ancient Egypt was the seat of culture and learning; many students were drawn there from other lands in search of knowledge, and we are told that during the time of Herod-

otus, about 500 B.C., dentistry was practised as a specialty, so that "Egypt is quite full of doctors: those for the eyes, those for the head, some for the teeth, others for the belly or for occult maladies."

The Saracens invaded Egypt in the seventh century, and in 642 A.D., shamefully destroyed the great library at Alexandria. It is probable that much valuable literature pertaining to early medicine and dentistry was thus lost, among others the writings of Herophilus and Erasistratus, who, about 300 B.C., were pioneers in dissection not only of cadavers but of living men condemned to death by the kings of Egypt.

Dental art among the **ancient Egyptians** is described at some length in the papyrus of Ebers—a name derived from the material on which it is written (papyrus, a form of ancient parchment, or paper), and the discoverer, Prof. George Ebers, who found it at Thebes in 1872 (Fig. 1). This work, which dates from 3500 to 1500 B.C., gives many remedies for toothache and the so-called "Bennut blisters in the teeth." These remedies consisted of dough, honey, oil, fennel seeds, incense, onions and similar ingredients used in various combinations, to be made into a plaster and applied to the aching tooth. One prescription consists of the following:

Seps-grains	Part 1
Dough	Part 1
Honey	Part 1
Oil	Part 1

To be applied as a plaster.

The word *uxedu*, probably referring to an abscess or painful swelling, occurs many times in this work, though one finds no mention of dental or oral surgery.

Joseph Linderer says that artificial teeth roughly fashioned of wood have been found in Egyptian sarcophagi—a tomb or casket hewn in a form of limestone, which it was said would consume the entire human body with the exception of the teeth in a short time.

George H. Perine, of New York, says that both filled and artificial teeth have been found in the mouths of mummies, the former stopped in some cases with gold and in others with gilded wood. It is supposed that these fillings were inserted during life for the purpose of preserving the teeth, though by some writers it is conceded that this work may have been a part of the embalming process. Modern writers and investigators have thrown much doubt on the foregoing statement, since they claimed that no mummies could be located bearing evidence of such work. Dr. *Vincenzo Guerini,* of Naples, after making repeated search, declares that there

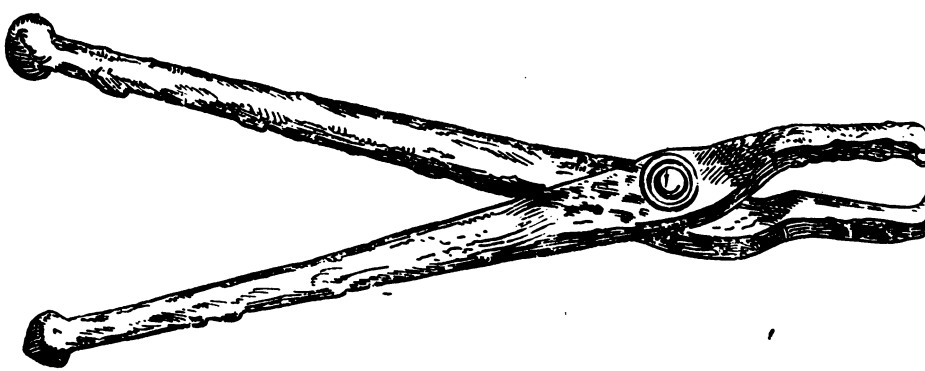

FIG. 2.—Roman dental forceps found (1894) at Hamburg, Germany, in the ancient Roman castle Saalburg. (Geist-Jacobi.)

is nothing to substantiate the claims of Dr. T. Purland, first published in England in the *Quarterly Journal of Dental Science,* 1857, i, 49 and 63, from which the statement of Dr. Perine was evidently taken. He says, however, that so intelligent a people could hardly have been ignorant of dental prosthesis, and gives an account of one specimen of Egyptian origin discovered at Saida (the ancient Sidon) in 1862, where several teeth were found wired together.

It is evident that dentistry in some of its cruder forms must have come into being as soon as man began to experience trouble with his teeth. The teeth are likewise largely relied upon to furnish diagnostic evidence in determining whether

prehistoric skulls found in excavating are of human or animal origin. Prehistoric teeth do not, as a rule, show evidence of caries, and if it be present it is said to be an evidence of considerable age, though it is difficult to understand the reason for this assumption, since caries is usually most prevalent among children. Signs of abrasion are quite common, owing to the food habits and long life of the subject.

The oldest written account of a dental operation, other than extraction, is found in a statement by *Archigenes*, of Rome, who advocated the trephining of a tooth which ached without there being evidence of caries, his idea being that the pain was caused by morbid material in the interior of the tooth, which by this means could be evacuated.

Among the ancient Hebrews neither the Bible nor the Talmud makes any mention of dental operations, though the teeth and their beauties are often extolled. "An eye for an eye and a tooth for a tooth" was a part of the law of the land, as, also, "If a man smite out one of his servant's teeth he shall let him go free."

The Chinese boast a very ancient civilization, and it is not unlikely that dentistry in some of its cruder forms was known to them at a very early period in the world's history. The Chinese "Father of Medicine," was Hwang-ti, who lived about 2700 B.C.

The celebrated medical works of China refer to toothache, which is called "Ya-tong," and describe nine varieties of this malady, and in addition thereto seven distinct diseases of the gums. Puncturing the gums as well as distant parts of the body for the relief of toothache and abscesses was practised, this being, perhaps, one of the oldest forms of dental or oral surgery. The same method of treatment, known as acupuncture, was applied to many other diseases as well and the Chinese doctors chose their points of election in a very scientific and learned (?) manner, having altogether three hundred and eighty-eight sites for puncturing, twenty-six of which were for the relief of toothache. For this purpose they used gold, silver or steel needles and cauterized the site afterward with a cone of moxa, a sort of slow-burning

vegetable wool applied through a hole in a coin. The moxa is compact and burns slowly, drawing up the epidermis into a blister without violence or excessive heat.

According to Dabry, the Chinese believed there were worms in the teeth, and among the remedies used therefor arsenic is said to have been made into pills, and one placed near the aching tooth or into the ear on the opposite side from the aching organ, whereupon the pain would positively cease. Another favorite prescription used by the Chinese read as follows: "Roast a bit of garlic and crush it between the teeth; mix with chopped horseradish seeds or saltpeter; make into a paste with human milk; form pills and introduce one into the nostril on the opposite side to where the pain is felt."

According to the Greeks, *Æsculapius,* the *God of Medicine,* is supposed to have been the son of Apollo. Cicero mentions three deities of this name, the third of which was said to be the son of Arsippus, who was the first to teach tooth-drawing and blood-letting. The instrument used for tooth-drawing is supposed to have been the "odontagogon" of lead mentioned by Celius Aurelianus and exhibited in the temple of Apollo at Delphi. Æsculapius, who was worshipped by the Greeks as one of their many gods, was said to have healed the sick and to have raised the dead as well. As time elapsed there were reputed to be not only one, or, as related by Cicero, three Æsculapii, but tradition gave rise to many gods of this name to whom numerous temples known as "Asklepeia" were erected, among which was the famous temple of Cos, where Hippocrates gained most of his knowledge of medicine. The priests or followers of Æsculapius were known as "Asklepiadi."

To **Hippocrates** is accorded the honorable title of *Father of Medicine,* and even in those early days the "oath of Hippocrates" was a solemn obligation to be taken by all who undertook the study or practice of medicine. Hippocrates was born on the island of Cos about 460 B.C., and first studied medicine under his father, but later devoted his attention to the medical books in the temple of Cos. Hippocrates wrote much in regard to dental maladies and their

remedial measures, among which were considered extraction and cauterization. He was the inventor of certain crude dental forceps and other dental instruments. He practised the extraction of loose teeth and cauterization of those that ached but were not loose. He also recognized that the first teeth are formed before birth by the nourishment of the fetus in the womb.

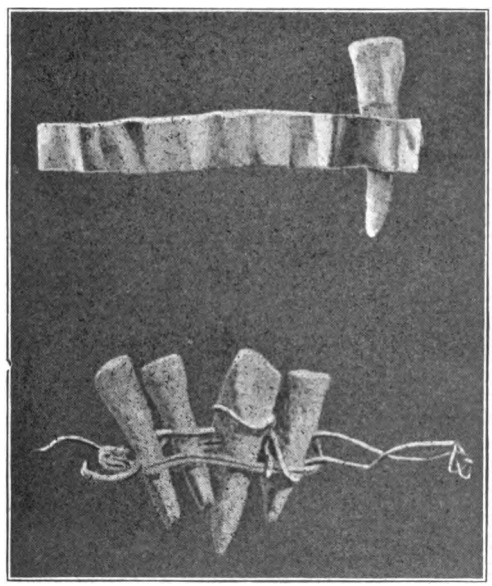

FIG. 3.—Two Greek appliances existing in the Archeological Museum of Athens.

In speaking of fracture of the lower jaw, Hippocrates recommended binding the teeth next to the lesion together. He distinguished between the complete and the incomplete fractures and treated separately of fractures of the symphysis. If the teeth were loosened he advised binding several together on either side of the fracture until consolidation of the bone had taken place, using for this purpose either gold wire or linen thread (Fig. 3).

At this time lay medicine had begun to supplant sacerdotal medicine, and healing by the priests as a religious rite was slowly giving place to more scientific and rational methods.

Galen, who lived about six hundred years after Hippocrates, was an able writer and commented on Hippocrates's work. Galen was a noted anatomist, and although he classified the teeth as bones, he said they were unlike other bones. He was the first to recognize nerves (pulps) in the teeth, and also erroneously believed that the teeth have something to do with the sense of taste. In his anatomical researches he recognized seven pairs of cranial nerves and classified the trigeminus as the third pair. He was also of the opinion that the teeth grow and thus repair the wear on them, basing his opinion on the fact, no doubt, that a tooth having no opponent became longer. In painful dentition Galen advised rubbing the gums with the milk of a bitch or the brains of a hare. He was, in his day, one of the most famous medical men of Rome and the author of many works on medicine.

By this time the doctors' shops were well supplied with medicines, bandages and a great variety of instruments, showing that the medical art had made considerable advancement. Dentistry had not yet become a separate profession, but was practised by the doctors along with medicine and surgery.

The Etruscans, or early Italians inhabiting that part of Italy known as Etruria, between the Tiber and Arno, about 1000 to 200 B.C., used bridges made of gold rings holding ox teeth, for the purpose of replacing lost dental organs. An illustration of a very interesting piece is shown herewith (Figs. 4 and 5). It consists of a series of gold rings skilfully united, and was evidently made by a dentist of no mean ability.

Just who these Etruscans or Toshi were, from whence they came or what became of them is not definitely known, and their language is equally extinct, no code having been discovered by which their writings can be deciphered.

The Romans have also left us some specimens of bridgework and other prosthetic appliances, which for the most part are found in tombs or in the urns containing the ashes of those cremated. It was said to be a custom to remove such pieces from the mouth before cremation and afterward

place them in the urn with the ashes. According to the Law of the Twelve Tables, written in Rome about 450 B.C., it was not unlawful to bury or burn corpses with the gold that was used to bind the teeth together. At this early

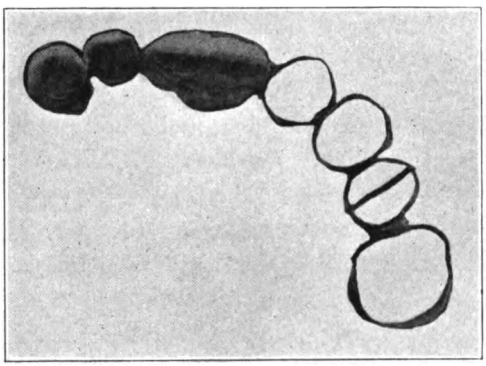

FIG. 4.—Etruscan appliance for supporting three artificial teeth, two of which were made of one tooth. (Civic Museum of Corneto.)

period in the world's history, Rome must have had dentists, though she had as yet no doctors.

According to Dr. Guerini and others a gold crown (Figs. 6 and 7) is now in the museum of Pope Julius, in Rome, which was discovered in excavating at Satricum, near that city.

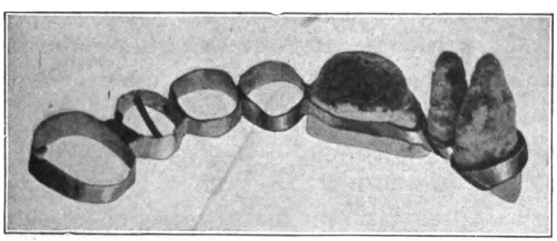

FIG. 5.—The same appliance reversed.

This would tend to prove that the Etruscans not only did bridge-work, but were versed in the art of making crowns also. The appliance found at Satricum was made of two plates of gold stamped to represent the labial and lingual

surfaces of the lower central incisor, and were then soldered together to form the crown of the tooth. It is soldered to a narrow strip of gold which is contoured in such manner as to encircle the neighboring teeth, which act as a support for the appliance.

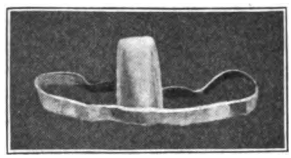

FIG. 6.—Roman appliance found at Satricum; crown of lower incisor made of gold.

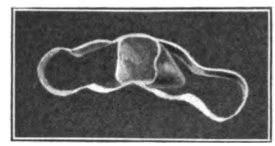

FIG. 7.—The same seen from below.

Saint Apollonia (see Frontispiece), in the year 300 A.D., was canonized by the Church of Rome, and since then has been the patron saint of dentistry. The ninth day of February has been observed by the Church of Rome in her commemoration. A photograph of the painting of this saint was, in 1900, presented to the Academy of Stomatology of Philadelphia, on behalf of Dr. Mary H. Stillwell, of Pittsburgh, by Dr. C. N. Pierce, together with this historical sketch:

"Longing to obtain the grace of baptism, she made her way to Saint Leonine, a disciple of St. Anthony of Egypt, and, as he baptized her, he bade her go to Alexandria and preach the faith. So she went forth, and though she was only a woman, young and frail, yet so eloquent were her words, so fervent her zeal, that she made many converts. About this time a tumult had been stirred up in the city against the Christians and the mass of the people were enraged at her teaching and came with bitter complaints to her father, who gave her up to be judged by the governor. They brought her before the idol temple and bade her worship the graven image. It is reported that she made a sign of the cross, and there came forth from the statue an evil spirit shrieking, 'Apollonia has driven me hence!' This was more than could be borne; the people thirsted for vengeance, so

they tried by torture to overcome her constancy. She was bound and one by one her teeth were drawn out, but still she did not flinch or fear, and on her refusal to accede to the demands of her persecutors and renounce her faith, she was brutally clubbed about the head and face, and subsequently suffered death by fire.

"For a period of nearly fifteen hundred years her intercession has been sought for relief from all pain incident to dental diseases, and her relics have been and are regarded as possessing great efficacy in the cure of the same."

Scribonius Largus, writing during the first century of the Christian era, was perhaps the first author to give rise to the belief that worms were the cause of pain and decay in the teeth. As we shall find later this superstition existed throughout the Middle Ages, and it was not until the early part of the eighteenth century that Fauchard first cast doubt on their existence. As a remedy for these worms, Scribonius Largus suggested that if the seeds of hyoscyamus (henbane) be burned on charcoal and the fumes inhaled they would cause the worms to fall from the teeth. It is a noteworthy fact that the seed buds of henbane, when burned, form an ash that much resembles worms, and as the drug has a narcotic effect that probably soothed and relieved the pain, it is no wonder that the ignorant populace of that time readily gave ear to such seemingly plausible humbug.

Scribonius is also authority for the statement that the tooth powder used by the famous, as well as infamous, Messalina, wife of Emperor Claudius, was composed of calcined stags' horn, mastic of chios and sal ammoniac.

Horace, who antedates the poet Martial, informs us in his satires that false teeth were known in his day, for he says, speaking of two old witches, "You would have laughed to see those two old witches run toward the town losing in their flight, Canidia, her false teeth, Sagania, her false hair."

Martial, the poet, who lived during the first century A.D., refers in his epigrams to toothpicks made of lentisk wood, and ridicules the old dandy who cleans his toothless mouth with lentiski to give himself the appearance of one less.

stricken with age. Again, he makes a tooth powder say to one who has lost her natural teeth: "What have you got to do with me? Let a girl use me. I am not accustomed to clean bought teeth." In another epigram he says: "Without any shame, though usest purchased locks of hair and teeth. What will you do for the eye, Laelia? These are not to be bought." And again he says, "She at night lays down her teeth, just as she does her silken robes."

Martial names a certain Cascellius, who, he says, "extracts or cures diseased teeth," he being the first dentist of whom there is any recorded information.

Celius Aurelianus gave an account of the *odontagogon of lead* found in the temple of Apollo at Delphi, by which it was assumed that teeth should not be extracted unless loose enough to be removed with a leaden instrument, though some have contended that this was only a model placed there, probably by Æsculapius, to be reproduced with an iron instrument by those wishing to copy it, lead being less affected by corrosion, and therefore more lasting. He also wrote on fractures and dislocation of the jaw, and described the methods to be used in their reduction.

Celsus gave a prescription for producing sleep in persons afflicted with toothache. It contained acorns, castoreum, cinnamon, poppy, mandrake and pepper. When there was a large carious hollow in the tooth to be extracted, Celsus recommended that it should first be filled either with lint or lead, in order to prevent the tooth from breaking under the pressure of the instrument. It is not definitely known that he used fillings as a means of preserving the teeth or relieving toothache.

Caius Plinius Secundus (born 23 A.D.) said that "Teeth fall out in old age, and then spring up again; of this there can be no doubt." He relates one case in which the teeth appeared after the one hundred and fourth year. The absurdities believed in at that time are illustrated by the following quotation from Pliny: "In many mountains of India, according to what Ctesia writes, there are men with dogs' heads who clothe themselves with skins and bark

instead of speaking; also men having only one leg, who have great speed in leaping, and others without any neck who have their eyes between their shoulders."

Archigenes, who lived in Rome toward the end of the first century, was the first to have surmised that toothache, in certain cases, results from diseases of the interior part of the tooth (viz., inflammation of the pulp) and to have discovered a remedy therefor. When a tooth appeared discolored and was the seat of violent pains, which were not relieved by the usual remedies, he applied a trephine and drilled into the pulp chamber, his idea being that the "morbid humors" were by this means evacuated.

Marshall H. Saville, according to an article in the *Bulletin of the Pan-American Union,* reported the finding of teeth inlaid with gold, turquoise, rock crystal, red cement and other foreign substances in skulls of the aborigines who lived in various parts of North and South America. These teeth had been bored out with some tool and the filling skilfully placed in the cavity. This custom was quite common in Mexico, Central America and the province of Esmeraldas, Ecuador. In this latter province he also secured an upper jaw from one of the natives which contained not only teeth inlaid with gold, but also a right lateral incisor which had been transplanted to replace a lost central incisor, showing that dentistry had reached a high stage of development as a means of ornamentation at least. He also discovered in an excavation at Copan a lower jaw with a left lateral incisor that had been carved from some dark stone and implanted to take the place of one that had been lost. In one case several teeth were found bound together with gold bands.

There are in the Peabody Museum of Harvard University teeth in which had been placed inlays of jade, iron pyrites and gold, some of them arranged symmetrically in triangles, also banded inlays, all of which apparently were used for ornamentation (*Dental Cosmos,* 1916, lviii, 281).

Among Primitive Peoples, even at the present time, some very peculiar customs prevail which have, no doubt, been a heritage from ancient times. Most of these people have beautiful strong teeth which they ornament and embellish

in various ways for cosmetic or religious purposes, much to the detriment of these valuable organs. The substitution of gold teeth for missing ones has been practised in Java from remote times, and among the natives in many parts of Asia and the Pacific Islands there is prevalent the custom of dyeing the teeth black. In Sumatra the women file their teeth down to the gums or into points, or partially remove the enamel, so as to be able to apply the dye.

In Japan the married women dye their teeth black in order to distinguish them from the single women, using a dye that is made of urine, iron and a substance called "saki." It is claimed that this dye is very durable and does not wear off

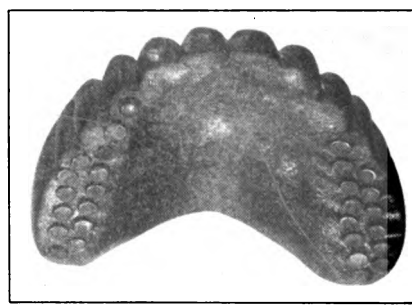

FIG. 8.—Old Japanese upper denture with black teeth made entirely of wood. Metal tacks are used as a substitute for cusps of bicuspids and molars and show considerable abrasion. Note the wear on the anterior teeth. (Army Medical Museum, Misc. Ser. 73.)

for many years. Dr. L. Ottofy,[1] in an article on "Dentistry in Japan," says, "The practice of blackening teeth, as a symbol of the marital state, on the part of women is becoming obsolete, yet a number still continue the practice." Formerly large quantities of black artificial porcelain teeth were exported from America to Japan, where artificial plates for men and single women were made with white teeth and those for married women with black teeth. There are on exhibition in the Army Medical Museum at Washington, D. C., several sets of teeth of Japanese origin, carved from wood, that bear out the foregoing statement (Figs. 8 and 9).

[1] Dental Review, Chicago, September 15, 1899.

In Eastern India some of the people plane their teeth down to an even level and dye them red by masticating areca nuts. It is also said to be a custom in New South Wales for a young man to have his front teeth knocked out with a stone on

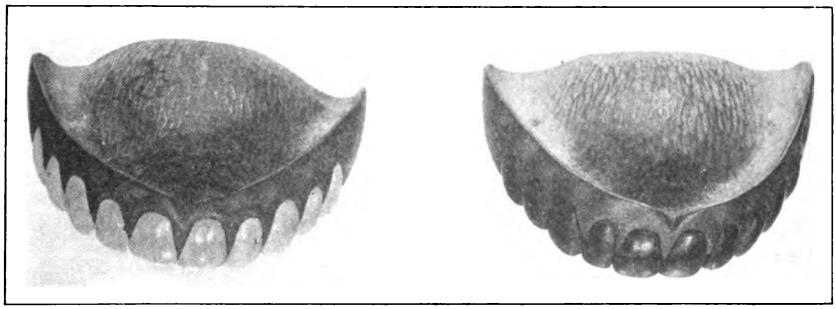

FIG. 9.—Two full upper plates of Japanese origin, one with white and the other with black porcelain teeth attached. The gum is skilfully carved of a reddish colored wood, and is very thin and light. (Army Medical Museum, Washington, D. C., Path. Ser. 11824.)

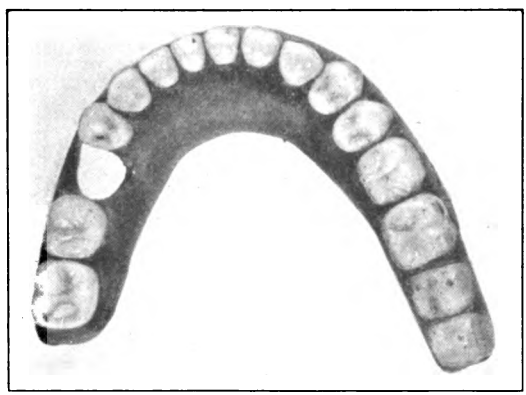

FIG. 10.—Lower denture of vulcanite and porcelain made by a native dentist of India. Contributed to the Army Medical Museum, Washington, D. C., by Dr. N. M. Caina, Galle Face, Colombo, Ceylon (Path. Ser. 12284). Note the four molars on the right side while the left side has only two.

reaching the age of virility, this being supposed to enhance his personal appearance. The natives of the Hawaiian Islands knock out their front teeth as a sacrifice to their god Eatoa.

CHAPTER II.

DENTISTRY DURING THE MIDDLE AGES.

Abulcasis (1050–1122), an Arabian author, who lived at Cordova, was one of the most able writers and surgeons of the Middle Ages. He wrote a treatise on medicine, entitled *De Chirurgia*, consisting of three volumes, the first of which was devoted entirely to the subject of cauterization, a form of treatment much practised at that time. His method of performing this operation was to insert a red-hot cautery through a tube to protect the surrounding parts.

He was especially interested at that early date in prophylaxis and devoted special attention to the tartar on the teeth, illustrating and describing fourteen forms of scrapers or scalers for its removal (Fig. 11). He was a very religious and devout man, cautious in the treatment of his patients and firmly opposed to the needless extraction of teeth. When it became necessary to extract, he used one form of forceps to loosen the tooth and another for its removal. Elevators were used if the forceps failed or the tooth was broken. According to this author, replantation was extensively practised and artificial substitutes were made of ox bone to replace teeth that had been lost. He advocated replanting teeth that had been removed by mistake or accident, holding them in place with ligatures of gold or silver wire until they had again become firm.

Rhazes, another Arabian author of that period, described a material, composed of ground mastic and honey, which was used for the purpose of filling carious cavities.

Ali Abbas practised cauterization for the relief of toothache by passing red-hot needles through a metallic tube in the same manner described by Abulcasis.

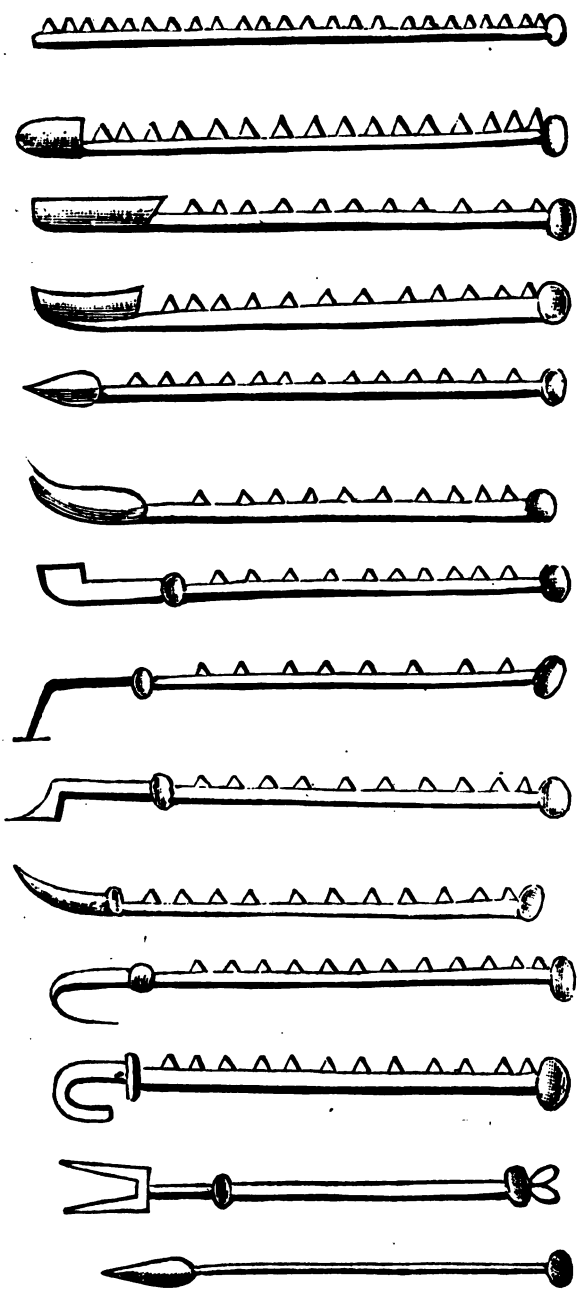

FIG. 11.—Set of fourteen dental scrapers. (Abulcasis.)

Avenzoar, another Arabian physician, says the extraction of teeth was sometimes inflicted as a punishment for having eaten flesh during Lent, or on those found guilty of felony.

Garriopontus, an Arabian writer, in 1045 A.D., said: "On the island of Delphi a painful molar tooth, which was extracted by an inexperienced physician, occasioned the death of a philosopher, for the marrow of the tooth, which originates from the brain, ran down into the lungs and killed that philosopher." For all we know this is the first record of a death resulting from the extraction of a tooth.

John Gaddesden (1400–1450), an English doctor at Oxford, stated that dried cows' dung or the fat of a green frog would positively cause teeth to fall out when applied to them, and said, "If an ox, peradventure, chewed a little frog with the grass, its teeth would fall out on the spot." He is also authority for the statement that "The brains of a hare rubbed on the gums not only facilitate dentition but will make teeth grow again where they have been lost." All of these remedies were recommended and employed by many later writers, who claimed to have performed marvellous cures by such absurd treatment.

Such statements as the foregoing seem ridiculous to us, as anyone could have easily satisfied himself of their falsity. The application of the cautery or arsenical compounds must have met with some success, as the latter is known to produce extensive necrosis.

The author cannot help but feel that the priests of old who cured toothache by incantations—Scribonius Largus, who drove worms out of teeth with the fumes of hyoscyamus seeds, —and John Gaddesden, who anointed them with frogs' fat to cause their exfoliation—have their counterpart in some of the writers of the present day, who express their ideas in such deep scientific lore, often coining new terms for mystery's sake, that their deductions are not intelligible to anyone but themselves, and thus any benefit that might otherwise accrue to the bewildered reader is irreparably lost.

Guy de Chauliac (1300–1368) was the most noted surgeon of the Middle Ages. He and others of that period wrote

extensively of dental ailments and operations for their relief by both physicians and barbers. Guy followed in the footsteps of the Arabians, who had made considerable progress before him, and referred explicitly to *dentators* and their instruments, thus beginning the recognition of dentistry as a specialty of medicine. He advised that dental operations be performed for greater security under the supervision of doctors, but had no criticism to make of dentators. This learned doctor used camphor, sulphur, myrrh and asafœtida as a filling material for carious cavities, and, like his predecessors, lent belief to the superstitious idea of worms in the teeth. It is uncertain whether the worms referred to by him were particles of decaying food, nerves, larvæ of insects or the burning henbane seed, as previously referred to, but the accepted belief was that they were responsible for the pain in odontalgia. Fumigations with seeds of leek, onion and henbane mixed with goats' tallow were resorted to in order to drive out the worms, after the manner first described by Scribonius Largus.

Guy de Chauliac also refers to medicines which send the patient to sleep, among which are decoctions of opium, hyoscyamus and lettuce. A new sponge was soaked in these medicines and then dried, and when sleep was to be produced it was wet and applied to the patient's nostrils. This form of anesthesia must have been very effective, for it is related that it was used for surgical operations, amputations actually being performed in this manner. To awaken the patient from this deep slumber, another sponge was wet with vinegar and applied, or the juice of the rue fennel was placed in the patient's nostrils. This fact is of great importance, as it marks the first step in general anesthesia and antedates Horace Wells's discovery by five hundred years, though it is doubtful if this old method was ever used extensively. This author is the first to cast doubt on the efficacy of the fat of green frogs for the purpose of causing the teeth to fall out. Superstition being uppermost in the lives of the people in those days, it took considerable courage to contradict the old authorities on such a well-established belief.

In 1308 the barbers and surgeons of London were incorporated into one guild and the name of barber-surgeon was used to denote practitioners in all branches of surgery. This arrangement lasted until 1745 before it was finally dissolved, after which the barbers were only allowed to extract teeth. This should give one a fair conception of the low repute into which surgery had fallen during that period.

The title of Doctor was first bestowed by the universities during the twelfth century and was used to denote a learned man in any profession. The title of *Doctor of Medicine* was first bestowed on William Gordenia by the College at Asti, in Italy, in 1329. Whether this title was earned or honorary is not known. The title of *Surgeon Dentist* was first given to Gillies and several other men in France in 1622, though the title was not fully established for many years afterward (see Koch's *History of Dentistry*, i, 20–21).

Giovanni Plateario (1450–1525), a professor at Pisa, was the first dentist to use the sitting posture for performing operations on the teeth, others before him having used the horizontal position. The prevailing custom was to let the patient lie prone on the ground and to hold his head between the operator's knees with a vise-like grip. Plateario is also credited with being the first to see that the surrounding air was pure and to give any thought to the need of asepsis as an aid in performing surgical operations.

Giovanni d'Arcoli (Joannes Arculanus) (died 1484), professor at the University of Bologna and later at Padua, about 1450, wrote for the first time of the use of gold-leaf for the purpose of filling carious teeth, and also gave drawings and descriptions of three dental instruments of his day—the pelican (here called "pulicanum"), dental forceps and stork's bill (Figs. 12, 13 and 14). This is the first authentic record we have of gold fillings being placed in human teeth for their preservation during lifetime, the history and purpose of such fillings as may have been found in the mouths of Egyptian mummies, previously referred to, being uncertain.

Giovanni di Vigo (1460–1520) described removing carious matter from the teeth and filling them with gold-leaf, and

also insisted that this class of work be done by specialists, such as barbers and quacks, who had experience in this line of surgery and had attained to a high degree of manual skill, rather than by surgeons, of whom he was one.

It is not apparent that gold filling was original with either of these writers, since neither of them treat of it specifically. Giovanni d'Arcoli, after making mention of the many methods of treating the teeth, merely refers to the manner of filling

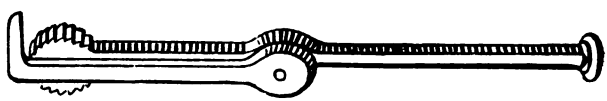

FIG. 12.—The pelican as represented in Giovanni d'Arcoli's work. Forceps pro extrahendis dentibus pulicanum dicta.

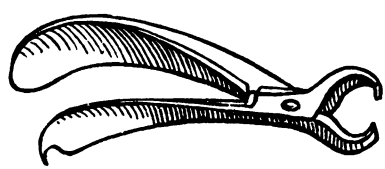

FIG. 13.—Dental forceps (Giovanni d'Arcoli). Forcipum pro extrahendis dentibus forma.

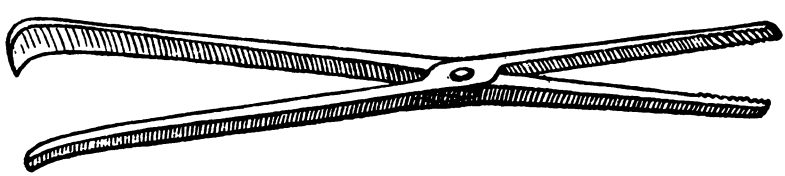

FIG. 14.—The forceps called "stork's bill," as represented in Giovanni d'Arcoli's work. Forceps pro extrahendis fragmentis quod Rostrum Ciconiæ dicent.

them with gold, as though it were an operation already well known and understood. This custom probably dates back to the latter part of the eighth century, since some of the older writers, especially the unknown author of *Zahnarzney-büchlein*, printed in Leipzig by Michael Blum in 1530, credits Mesue, surgeon to Caliph Haroun al Raschid (786–809), with the use of gold-foil as a filling material. This, however, has not been reliably established.

CHAPTER III.

DENTISTRY IN THE SIXTEENTH AND SEVENTEENTH CENTURIES.

DENTISTRY, with the other arts and sciences, made its most notable advancement as a learned profession during the sixteenth century, for it was about this time that the world as we know it, made its first rapid strides forward. The invention of the printing press in 1436, the taking of Constantinople by the Turks in 1453 and the discovery of America in 1492 all led to much migration of peoples and the dissemination of knowledge, which constituted the beginning of a new era in which dentistry had its part.

In Germany dentistry had been practised for many centuries, as shown by artificial teeth in the urns of those who had been cremated, and at this time the Germans had made considerable progress. Here, as elsewhere, medicine was first practised as a religious rite combined with witchcraft and empirical remedies. As early as 1460 Heinrich von Pfolsprundt wrote a book on medicine and surgery in which he described wounds and fractures and the mode of their treatment. Pains of the teeth and gums were treated by him by the use of beverages, showing his lack of skill in that direction.

Walter Herman Ryff (died 1570) wrote the first book which treated of dentistry independently of medicine in 1548. He is conspicuous for the fact that his book was written in German, a living tongue, instead of the customary Latin, so that he may be looked upon as the first who attempted to diffuse useful medical knowledge among the common people. One of the most interesting things about his writings is that he is the first author to recognize the relation between diseases of the eyes and teeth, declaring that because of their inti-

mate relation, neither can be healthy without the other being so too. While this reasoning is clearly wrong in the light of our present knowledge, it nevertheless marks a step in the right direction. According to Ryff the principal causes of dental diseases are heat, cold, traumatism and the gathering of humors, and he says "The most atrocious pain is when an apostema ripens in the root."

Andreas Vesalius (1514–1564), who at the eatly age of twenty-five years became famous as an anatomist, was the first who dared to correct the errors in Galen's work, and gave a much more accurate description of the anatomy of the teeth than that given by Galen. His researches in regard to the teeth are incomplete, since he states that the permanent teeth grow from the roots of the temporary teeth. This erroneous conclusion was due to the fact, no doubt, that the deciduous teeth have no roots when shed.

Gabrielus Fallopius (1523–1562), a pupil of Vesalius, carried out more fully his investigations of the development of the teeth and corrected Vesalius' error by showing that the permanent teeth do not grow from the roots of the temporary teeth, but that they are generated twice over, the first time in the uterus. He gave the first account of the dental follicle, and likened the teeth in their formation to the feathers of a bird (*De Dentibus Libellus*, Venice, 1563).

Bartholomeus Eustachius (died in 1574) was another great anatomist of the sixteenth century. After long and patient research he brought much light to bear on the macroscopic (gross) anatomy of the teeth, the number and variations of the roots, the alveoli, etc., and gave a very clear description of the ligaments of the teeth and the means by which they are held in the alveolus. He also gave an account of the central cavity of the tooth, and stated that it contains blood-vessels and nerves, and not marrow, as was claimed by some anatomists. He also investigated the embryology of the teeth and confirmed the claim of Hippocrates that the first teeth are formed in the uterus. Eustachius is the first to deny that the teeth grow during a whole lifetime, as was first claimed by Aristotle. Speaking of dental diseases, this

author remarked that dental surgery was in his days a most abject calling, notwithstanding its having had as its initiator no less a person than Æsculapius, the God of Medicine.

Ambroïse Paré, born in France (1517–1592), is justly entitled to the credit of being known as the "Father of Modern Surgery." As an anatomist he is less accurate than

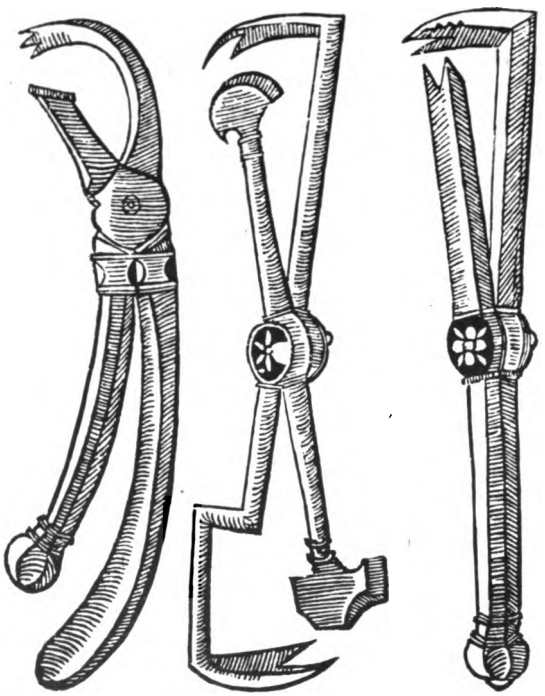

FIG. 15.—Two pelicans and a pair of curved pincers. (Ambroïse Paré.)

either Vesalius or Eustachius, but as a surgeon he gained great renown, having been successively a barber, surgeon-barber, and finally, in 1562, chief surgeon to the court. In his works this surgeon treated of dental maladies very thoroughly, which fact may be attributed to his having first been a barber and consequently a tooth-puller (Fig. 15). He described fractures of the jaw and the methods of their reduc-

tion with considerable thoroughness, and related some interesting cases which he had treated. In one instance a friend of his had his jaw broken and three teeth knocked out by a blow from a dagger, whereupon Paré so skilfully treated the injury that all the teeth were successfully replaced and made of use.

He referred to the evacuation of "morbid humors" by purgation, bleeding, etc., for the relief of toothache. While Abulcasis treated of replantation, Paré described it much more explicitly and insisted on its utility. He is also the first writer to describe a method of transplanting or transferring teeth from one mouth to another, although he never practised this form of surgery himself. In Chapter III, Book XVII, he gives an account of artificial teeth made of bone and held in place with gold or silver wires, while in Chapter IV of the same book he gives us the first account of palatal obturators to correct speech where the palate has been destroyed by a wound or syphilitic ulcer. Paré aptly described first dentition with its accompanying ills, and for these affections he recommended rubbing the gums with fresh butter, honey or the brains of a hare (roasted), and if these remedies do not suffice the gums are to be lanced. Paré also introduced ligatures to arrest hemorrhage from arteries in surgical operations and abandoned the practice of cauterizing wounds with red-hot irons. Paré was popular both with the common soldiers and with royalty, being chief surgeon at the Royal Court of Charles IX, Henry III and Charles X. The royal favor saved his life, since he escaped the massacre of St. Bartholomew by being hidden in the King's wardrobe.

The Golden Tooth.—In 1593 much was said in Germany of a Silesian child, aged seven years, in whose mouth a golden tooth had erupted. Great credence was given to this story and the learned doctors and philosophers speculated upon the phenomenon without the slightest doubt as to its genuineness. Many books and papers were written to explain the strange occurrence, and one writer, Jacob Horst, claimed that on the date of the child's birth, that is, December 22, 1585, the Sun was in conjunction with Saturn in the sign of Aries, and in consequence the nutritive force had devel-

oped so much that instead of osseous substance, golden matter had been secreted. It appears that the golden tooth was nothing more than a crown or lamina of gold let down deep into the gum, and made by a dentist or jeweler for the pur-

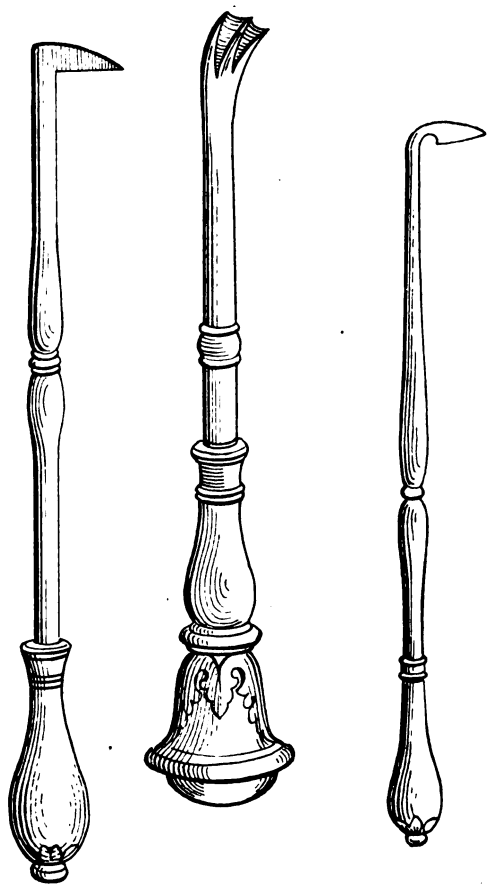

FIG. 16.—Two gum lancets and a trifid lever called "poussoir." (Ambroïse Paré.)

pose of deception, since a fee was charged for seeing the child. Balthasar Camindus, a doctor of Frankfort, had noted that the boy had not lent himself to being examined by the learned, who were likely to expose the fraud, and further

relates that a certain nobleman, being denied the privilege of seeing the tooth, struck a dagger into the boy's mouth and wounded him so badly that a surgeon was called and the fraud exposed.

In the early part of the seventeenth century the dental art was still in a pitiful state of development, as shown by the literature on the subject, only about twenty publications having appeared in Europe during the preceding century.

Johann Stephan Strobelberger, physician to the Imperial Baths at Carlsbad, published a book in 1630 in which he referred to "gout in the teeth," which included all of the diseased humors of the teeth that were supposed to fall by drops into the articular cavities and surrounding parts. In his writings we find that many crude and worthless remedies were still used for toothache, and the instruments for extraction consisted for the most part of the pelican, named from its likeness to the beak of that bird, and also some very rude forceps. He was one of the first to cast doubt on the value of fumigations with hyoscyamus seeds to cause worms to fall from the teeth, though he did not in the least doubt the existence of the worms themselves, suggesting oil of vitriol or a decoction made of a frog cooked in vinegar to kill them instead. Among the remedies he suggested for odontalgia is the American tobacco plant (Nicotiana tabacum).

Nathaniel Highmore (1613–1684) published a treatise on anatomy in 1651, in which for the first time the maxillary sinus named for him is accurately described, though its existence had long been known. He pointed out for the first time the anatomical relation between the teeth and antrum, and related a most amusing incident in connection with perforation of this sinus. A lady, having much pain in her teeth finally had the upper canine tooth extracted, after which there was an incessant flow of humors (pus) from the antrum. The patient herself wishing to learn the cause thereof, passed a silver probe into the cavity its entire length, which produced the effect of its having reached the eye. Much amazed she stripped a long feather and passed it into it so great a distance that she concluded that it had reached

her brain, not knowing that the feather simply curled up in the cavity. He was able to allay her fears by informing her of the cavity in the bone and the opening produced by the extraction of the canine tooth.

William Cowper (1666–1709) was the first to practise opening the antrum by the extraction of the first molar. This was toward the end of the seventeenth century, and he seems to be the first to recognize antral diseases. This was something like fifty years after Highmore had described the antrum.

James Drake, a contemporary of Cowper, operated in the same manner, and it was this author who made known in a book entitled *Anthropologia nova*, published in 1707, the method of Cowper, for which reason the above-mentioned proceeding is sometimes called the "Cowper-Drake operation."

Wilhelm Fabry, better known under the Latin name of Fabricius Hildanus (1560–1634), chief doctor to the city of Berne, gave some very interesting clinical reports on the relation between dental affections and tic douloureux, and cited an instance where a lady who had suffered atrociously for four years with pain in the head was completely cured by the extraction of four decayed teeth. He also gave an account of an interesting case of rhinoplasty performed by Dr. J. Griffon, an eminent surgeon of that day, upon a young girl of Geneva, whose nose had been cut off by the Duke of Savoy's soldiers in a fit of rage. Fabry testifies to the natural appearance of the nose even for twenty years afterward. He stated that Gaspare Tagliacozzi, of the University of Bologna, was the inventor of this operation.

Pierre Dionis (died 1718) writes of one Guillemeau (probably Jacques Guillemeau), who made teeth by fusing together white wax and gum elemi, and then adding ground mastic, powder of white coral and pearls. This composition, Dionis said, never turned yellow and was also used to stop (*i. e.*, fill) teeth. The foregoing fact is most important, as it marks the first step toward the manufacture of mineral teeth.

During the seventeenth century the belief in worms as the cause of dental caries and toothache was still in full vigor, as

shown by the writings of Johann Schultes, a noted physician in Ulm, as well as Nicolaus Tulp, of Amsterdam, both of whom prescribed remedies therefor.

Antoni Van Leeuwenhoek (1632–1723), a Dutchman, was the first to make high-powered microscopes with which, in 1678, he made discovery of the tubular structure of dentine, and in 1683 he discovered microörganisms in tartar scraped from between the teeth. From a perusal of his writings and drawings it appears that these bodies were bacteria rather than animalcules, as he supposed. Both Carpenter and Beal state that his work was done with single lenses, as the compound microscope did not reach a useful stage until about 1820 to 1830. It is astonishing how much was accomplished by such primitive means. This in all probability represents the first step in bacteriology, which was only made possible by the aid of high-powered lenses.

Lazarre Rivière (1589–1655) said that the worms in the teeth may be destroyed by the use of bitter substances. He also mentioned oil of cloves, which even then was used as a remedy for toothache by placing in the cavity a small piece of cotton-wool moistened with it. Oil of camphor and oil of boxwood were also used by this author, indicating a tendency toward rational treatment of toothache.

Matthias Gottfried Purmann (1648–1721) has the honor of being the first writer to make mention of wax models in connection with prosthetic work. Whether these models were made from molds or not is a disputed question, but the supposition is that they were carved to the desired shape and then passed on to a craftsman who reproduced them in bone or ivory.

Many other incidents of considerable interest during the seventeenth century have to be omitted in a history of this character, and consideration will now be given to the development of the eighteenth century.

CHAPTER IV.

DENTISTRY IN THE EIGHTEENTH CENTURY.

In 1700 France took the lead in the dental art and had recognized the importance of dentistry by requiring prospective practitioners to take an examination under the edict of 1699 to show their qualifications before entering the profession. There is abundant evidence that the Germans had also made considerable progress during the two preceding centuries, and they have likewise left us considerable literature upon dental surgery. Dentistry had already begun to flourish as a distinct specialty of medicine, but it remained, as we shall see later, for Pierre Fauchard to effect the final separation.

Lorenz Heister (1683–1758), of Frankfurt-am-Main, published a treatise on dentistry entitled *De Dentium Dolore* in 1711, in which he advised removing the decayed part of a tooth with a file or toothpick and filling the cavity with white wax, mastic or gold or lead-foil. In this work he gave a very concise description of removable prosthetic pieces made of ivory or hippopotamus tusks and maintained in position simply by their form. Heister also refers to nasal prosthesis, which was then carried out by applying noses of wood or silver, properly painted. There was at this time much contention among dentists as to the advisability of removing caries by the use of the file, as practised by Heister and others, because of the destruction of the enamel of the tooth. We find, however, that this was practised for a long period, and was advocated in a modified form by such eminent dentists as Drs. Chapin A. Harris and Robert Arthur more than a century later.

Up to the eighteenth century the clumsy pelican or rude forceps, used to exert lateral force on the tooth, was still in general use, but this was modified about this time into

what was known as the key of Garengeot, named after the man who perfected, though he did not invent, the instrument. According to some writers this instrument had its origin in Germany, not in England. It was a most efficient instru-

FIG. 17.—A Dutch dentist. (From a picture by Lucas Van Leyden).

ment for extracting teeth and was in general use for more than a century, having been extensively used in America, and is much used in France and other European countries at the present time.

In this connection attention might be called to the Japanese method of extracting teeth. It is said that the old-time Japanese dentist had no occasion to use forceps or instruments of any kind. He learned to extract teeth by first being given a board into which a number of pegs had been driven, which he learned to extract with the thumb and index finger only. These pegs were of different sizes and shapes, and were driven into the board tighter and tighter, until he who could extract them deftly was able also to "pull" teeth in like manner.

Johann Adolph Goritz, of Regensburg, writing in 1725, opposed too many extractions and also the insertion of prosthetic pieces, because they caused the loss of the teeth to which they were attached. This was due to their being wired to the natural teeth, causing great strain on and consequent loosening of the abutments.

Pierre Fauchard (born in Brittany about 1690 and died at Paris in 1761) was the founder of modern dentistry. He published a work in 1728 entitled *Le Chirurgien Dentiste*, which marked a new epoch in the history of the dental art. This book was highly commended by the leading medical authorities of the day. It was translated into German in 1733, and a second revised French edition was issued in 1746, and a third in 1786. It consisted of two volumes in duodecimo, with forty full-page plates, 863 pages in all, and treated of all branches of dentistry as understood and practised at that time. According to Fauchard dentistry was then an important calling, as he refers to the examination which prospective practitioners were compelled to undergo even as early as 1700, and advises that a dentist be included in the board of examiners. He expressed himself in no uncertain terms as to the need of a school of surgery in which the theory and practice of dental surgery could be properly taught. Fauchard lamented that so little was written by able dentists who had preceded him, because these men guarded their knowledge with secrecy lest someone might profit at the author's expense. In his book he makes known several improvements in prosthesis, in regard to which

FIG. 18

he said, "To the prejudice of my own interests I now give the most exact description possible of them," thus putting the interests of his chosen profession above his own purse.

It is a mistake to think that he created the art of dentistry, but that he placed it on a higher plane by many valuable inventions and by collecting and publishing all of the available knowledge on the subject, there is no doubt. To show how concisely he wrote, it may suffice to quote the following account of work that may be done on teeth:

"They may be cleaned; they may be straightened; they may be made shorter; caries may be removed from them; they may be cauterized; they may be filled with lead; they may be separated; they may be placed in proper position; they may be fastened; they may be removed from the jaw; they may be replaced in the jaw; or they may be taken out to be placed in another person's mouth; and at last teeth are artificially constructed, and may be placed instead of those that have been lost. All of these operations demand a skilful, steady and trained hand and a complete theory."

In this work he refers to the popular idea of worms in the teeth, which idea had existed for more than one thousand years. He admits the possibility of them, but states that he has never seen them, and that if they do exist they are not the cause of caries, but the eggs of insects may have entered carious cavities and there hatched and produced worms. Although Andry relates seeing very small worms with a powerful glass, Fauchard states that he employed the same means but could not see them. Thus he sets forever at rest this foolish superstition in regard to worms in the teeth as a cause of dental ailments so long indulged by the people of those times. Perhaps it is only as a matter of courtesy toward the many authors who preceded him that he admits their presence at all.

Fauchard gave a very accurate description of the anatomy of the teeth, their structure, position, origin, growth and anatomical parts, as body, root and neck. He described accurately the pulp cavity and root canals, and after a most thorough macroscopic description, goes into the histology of the teeth, following the writings of La Hire in 1699. Fauchard agrees with the popular idea of his day in regard to caries,

and states that it may have its origin within the tooth as well as without.

From a passage in the fifth chapter of Fauchard's work one learns that tooth-brushes were then already in use, but he says that those made of horsehair are too rough and frequently have a destructive action upon the teeth. He advised using small sponges, with which the teeth should be rubbed up and down, inside and outside, every morning. Before using the sponges they were to be dipped in tepid water or preferably aqua vitæ, "the better to fortify the gums and render the teeth firm."

He was strong in his condemnation of elixirs and cures by magical means so much practised in his day, and a reference is made to the large and increasing number of charlatans of the day, wherein he exclaimed "There will shortly be more dentists than persons affected with dental diseases." He laments over the poor quality of work done by them, relating a case where a deciduous tooth was extracted without roots, whereupon the dentist in an effort to extract the roots removed the permanent tooth just erupting.

Fauchard advised seating the patient in an easy arm-chair for the purpose of performing dental operations, and condemned the practice of seating him on the ground or floor and holding his head between the operator's knees, as was commonly done, as unskilful and unsanitary, and in the case of pregnant women, as capable of doing great harm. He practised opening the tooth for relieving abscesses by evacuating the pus. After three months he stopped these teeth to prevent their getting worse, but no mention of root-canal work is made, though he placed a little cotton-wool in the cavity with oil of cinnamon and allowed it to remain several weeks before filling them. Chapter VI of his work relates to filling teeth, wherein the author prefers fine tin first of all, next lead and lastly gold, which he says does not conform to the cavity as well as the other materials, but admits that some operators prefer it, saying, however, that it is more dear and not everyone can afford it. The author also speaks of a lead filling which lasted in perfect condition for forty

years. Cauterization was much practised to arrest caries and also to relieve toothache in his day, and was the only method of destroying nerves (pulps) at that time.

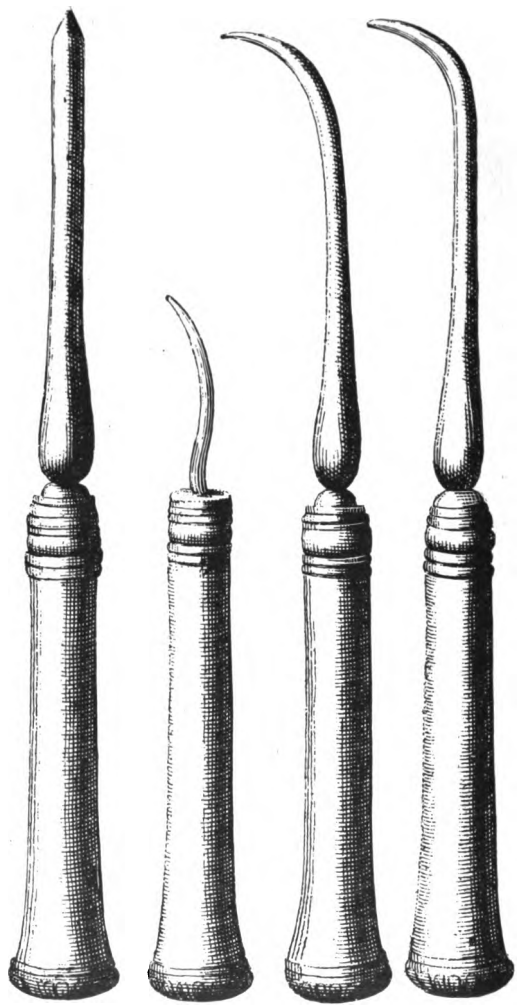

FIG. 19.—Instruments for scraping the carious cavities. (Fauchard.)

This author strongly combated, as did many other able men, the idea that pregnant women and nursing mothers

should not have operations on the teeth, but advises them to choose this course rather than prolonged suffering, which would be more liable to injure either the mother, fetus or suckling child than the operation itself.

FIG. 20

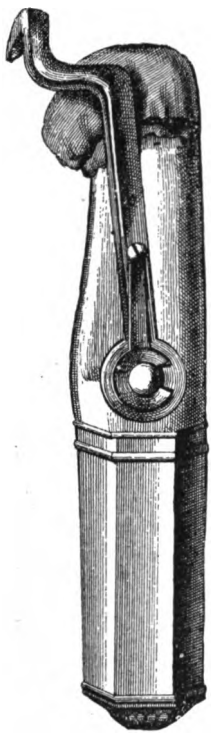

FIG. 21

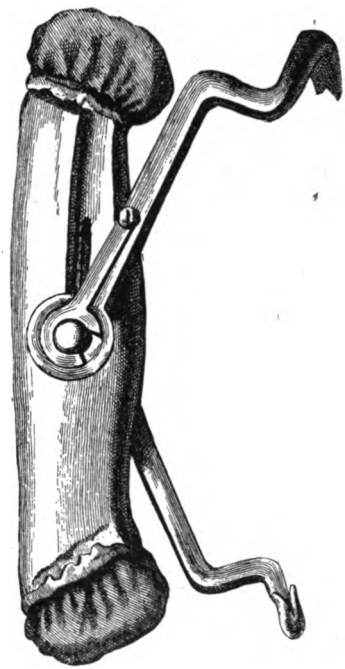

FIG. 20. — Fauchard's simple pelican (with one changeable hook). (Guerini.)

FIG. 21.—Fauchard's double pelican. (Guerini.)

Fauchard practised orthodontia, and relates a case in which he used the file and pelican and put a crooked tooth in place, which operation required about ten minutes. The most difficult cases he states required from three to ten days, and sometimes several months, to complete. He used gold and silver plates, which were perforated with holes through which he passed a silk thread for correcting irregularities, and

when this was not sufficient he forced them in place with the pelican or forceps.

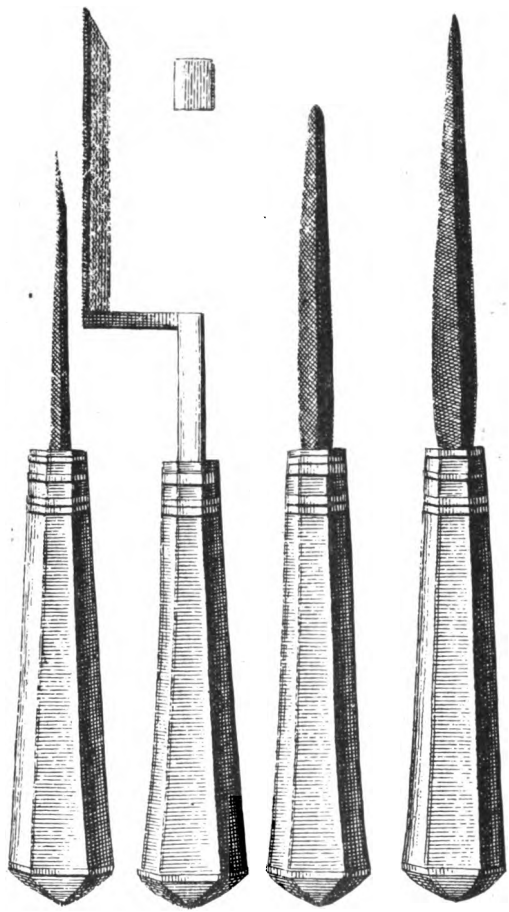

FIG. 22.—Some of the dental files used by Fauchard. The little square figure represents a small grooved wedge destined to be inserted in large interdental spaces, in order to give more firmness to the teeth to be filled.

In 1737 Fauchard made a full upper set of teeth for a lady of high rank, holding the same in place with springs, and relates that the lady ate with it easily and could not get along without it. He also relates having made a full upper

and lower set for a gentleman, who had worn them for more than twenty-four years. When a full upper set of teeth was

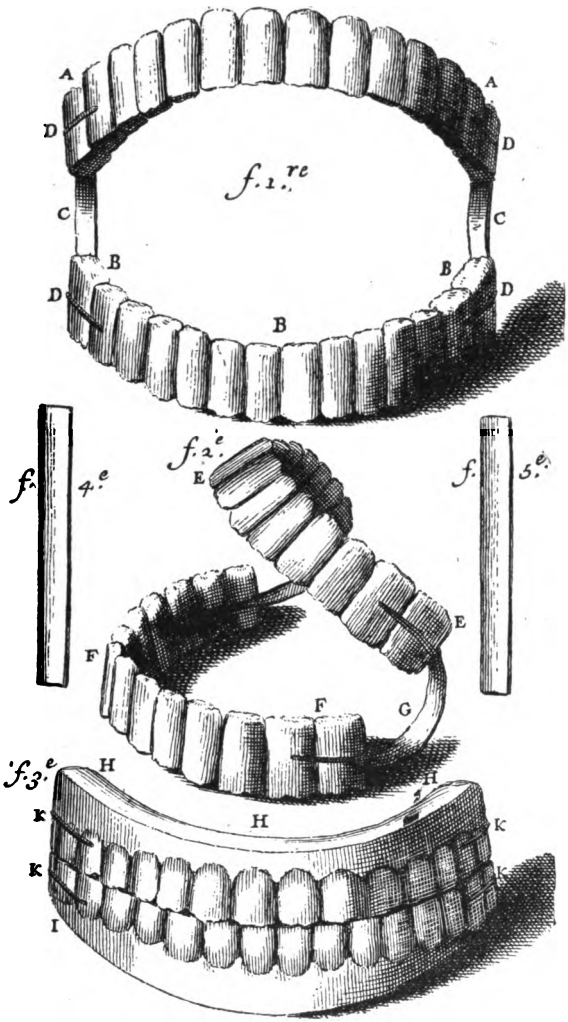

FIG. 23.—Complete dentures. *f.*3 represents an enamelled denture with artificial gums; *f.*4 and *f.*5, steel springs. (Fauchard.)

made, Fauchard used flat springs to hold the piece in place, atmospheric suction not being recognized and used until the

year 1800. He states, however, that he has been successful in three cases in placing full upper sets without the aid of springs.[1] He also brought palatine prosthesis to a high degree of perfection and described five kinds of obturators, which were, however, somewhat complicated. The materials most in use in dental prosthesis were human teeth, hippopotamus tusks, ivory of the best quality and ox bone. Crowns were placed on natural roots (if healthy) and held in place with screws or bound to neighboring teeth.

The second edition of Fauchard's work, which appeared in 1746, contains (pp. 275–277) the first account of pyorrhea alveolaris, familiarly called "Riggs's disease," after the American dentist, Dr. John M. Riggs, who, in 1876, introduced the method of scraping the tartar from the crowns and roots for its cure.

In the first edition of Fauchard's work (vol. ii, p. 30) mention is made of a machine for preparing and drilling into teeth. This machine is illustrated in *Elemens d'Odontologie* (Jourdain, 1756, p. 207). This was no doubt the beginning of the dental engine, and antedates the dental engine that the Greenwoods made from an old spinning wheel.

Finally, Fauchard refers to one remedy which is not in harmony with the rest of his admirable work, and that consists of rinsing one's mouth with one's own urine freshly emitted; but notwithstanding the absurdity of it, he asserts that many persons have found great relief by this means. As a substitute he states that rectified spirit of urine may be used.

Summing up his writings, we may say that, notwithstanding the falsity of some of his ideas, he was far in advance of his profession and was truly the founder of modern dentistry, and has given inestimable service to suffering humanity.

Mouton wrote a monograph on mechanical dentistry, in 1746, in which he described the application of "calottes d'or," that is, gold crowns, to teeth which are badly decayed. These when applied to the front teeth he enamelled so as to

[1] During the first part of the nineteenth century, almost all plates were fitted for the attachment of springs in case they were needed.

look natural. Mouton also invented a method of applying partial dentures by fixing them to the natural teeth with springs or clasps. He also practised transplantation of teeth as well as the correction of dental irregularities, and gained great renown thereby. He used subluxation of the teeth for the purpose of severing the dental nerve as a remedy against toothache.

Philip Pfaff, dentist to Frederick the Great, deserves passing mention, since he was the first German to write a real treatise on dentistry. He is the first author who practised capping an exposed nerve before placing a filling in the cavity, Fauchard usually filling the cavity directly over the exposure. He also described the construction of artificial teeth in which he made use of not only ivory, bone and tusks of the hippopotamus and the sea cow, but also of silver, mother of pearl and even enamelled copper. His most important contribution to science was the invention of the plaster model, poured in a beeswax impression.

Bourdet, dentist to the King of France, wrote a book on dentistry in 1757, in which the novel idea was advanced of extracting carious teeth, filling them with gold or lead and then replanting them. If the alveolus was injured he replanted the teeth immediately and performed the operation of filling afterward. He also used prosthetic pieces made entirely of gold and covered them with flesh-colored enamel on the outside, showing that some dentists of olden times were even more artistic than a large proportion of the practitioners of the present day who make no pretence of hiding their glaring gold crowns. He also made use of prosthetic pieces of hippopotamus tusk, to which human teeth were fastened with rivets.

L. B. Lentin, a German, wrote a pamphlet in 1756 in which for the first time electricity is recommended as a cure for toothache, though the use of the magnet had been advocated and practised by Patacelus, Teske and others, who claimed many cures by this means.

Thomas Berdmore, who was dentist to George III of England and the first dentist to the English Royal Family, is men-

tioned as having instructed Robert Wooffendale, by many reputed to have been the first dentist in America. Wooffendale emigrated to America in 1766, and though he was preceded by several men who practised the art, he was probably far more efficient than any who preceded him. In 1768 Berdmore published an excellent work on dentistry which went through many editions—three English, two German and

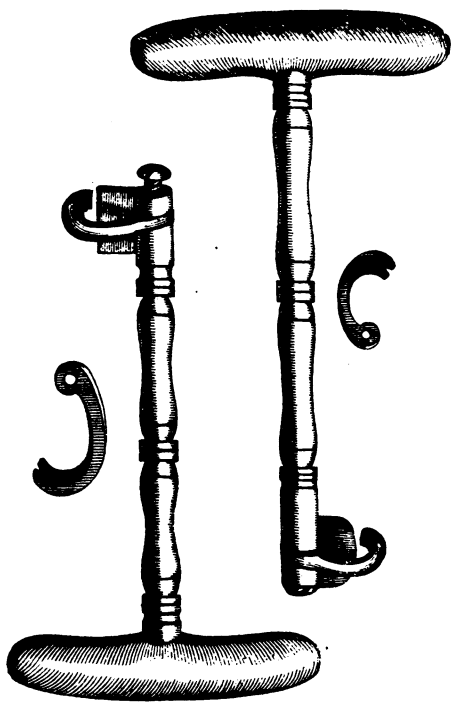

FIG. 24.—Two key instruments with changeable hooks. (Campani.)

the last an American edition, appearing in Baltimore, the cradle of American dentistry, in 1844, seventy-six years after the first edition, affording splendid proof of its value.

John Aitkin perfected the English key in 1771, which renders the extraction of teeth easier and less liable to fracture the jaw or teeth or injure the gums (Fig. 24).

John Hunter, the celebrated English surgeon (born February 13, 1728), studied under his brother William, who conducted a school of anatomy in London. In 1771 he published a book entitled *Natural History of the Human Teeth,* and in 1776 another work entitled *Practical Treatise on the Diseases of the Teeth.* He was a great lecturer and writer and kept a superb anatomical collection and extensive library. So great did his fame become that he was made Surgeon-General to the English Army. Hunter was a strenuous partisan of replanting and transplanting teeth, and described these operations much more fully than had been done before. He experimented by transplanting a sound tooth drawn from a living person into a cock's comb by making an incision with a lancet. When, some months later, the cock was killed the head was injected and examined and the tooth was found to be attached and circulation established as is found in the natural gums. If we may judge from early writings, transplanting and replanting were far more common at that time than at present, and also profitable, as may be judged by the charges of Paul Eurialius Jullion, whose fee was five pounds five shillings for transplanting a live tooth and two pounds two shillings for a dead tooth.

Willich, in 1778, makes reference to a woman, forty years of age, who though she was the mother of two children had never menstruated. The extraction of a tooth was followed by a hemorrhage that lasted an hour, and this hemorrhage recurred each month thereafter for a period of eight years.

Robert Bunon (died 1749), a French dentist born at the beginning of the eighteenth century, was one of the first to deny that the eye tooth has anything to do with the organ of sight, showing that it is supplied by the infraorbital nerve. He was an ardent champion of conservative dentistry and prophylaxis and succeeded in converting many medical men, surgeons and priests to his views. When Fauchard's book, *Le Chirugien-Dentiste,* appeared he was disappointed to find but little therein that interested him, and set about to write a book of his own. Before publishing his work he entered the College of Surgery to undertake two years' practice

with a regularly licensed surgeon, to undergo theoretical and practical examinations and to take oath before the Chief Surgeon of the Realm in accordance with the edict of May, 1699, in order to obtain the diploma of surgeon-dentist. He was highly eulogized by the principal journals of the time, and by this means won much fame and many wealthy clients.

One of the chief merits of his book is that of having ascribed to the deciduous teeth all of the importance that they really have. In cases of stomatitis, Bunon advised the complete removal of tartar before administering other treatment. He used the same measures against mercurial stomatitis in the specific treatment of syphilis.

INVENTION OF MINERAL TEETH.

One of the most important events in the history of dentistry is the invention of the mineral tooth. The question, who made the first porcelain tooth, probably never will be settled beyond doubt. There is no question that we are indebted to France for its production, and Dubois de Chemant is commonly accredited with the invention; but this is an error. As long ago as 1710, Guillemeau suggested a formula for a paste for artificial teeth composed of white wax, softened with a little gum elemi, to which was to be added a powder of white mastic, of coral and of pearl. It was claimed that teeth made of this composition never became yellow.

In 1728, Fauchard published his great work, *Le Chirurgien Dentiste*; in which we find at least the germ of the idea of porcelain teeth. In Chapter XIX he says: "I have thought that advantage might be derived from a regular and unalterable coloration from enamel artificially composed. I have also thought that I might from this not only perfectly imitate the enamel of teeth, but the gum, in cases where it is necessary to replace the teeth in whole or in parts of sets." There is no proof that Fauchard ever went further than the enamelling described, though Desirabode and Audibran both claim that he must have made whole sets of this material.

Almost fifty years later a French chemist or pharmacist, Duchateau, becoming disgusted with a denture he was wearing of hippopotamus ivory, on account of the disagreeable odor due in part to constantly tasting pharmaceutical preparations, as was then the custom, applied, in 1774, to M. Guerhard, a porcelain manufacturer of Paris, to have a porcelain set made. Due to the contraction of the porcelain many trials were made without success, but finally a set was made which he was able to wear, though not without defects. Finally, this set becoming unsatisfactory, new experiments were begun, but without success, whereupon he applied to the dentist, Nicholas Dubois de Chemant, of Paris, for collaboration, and a new denture was finally made which he was

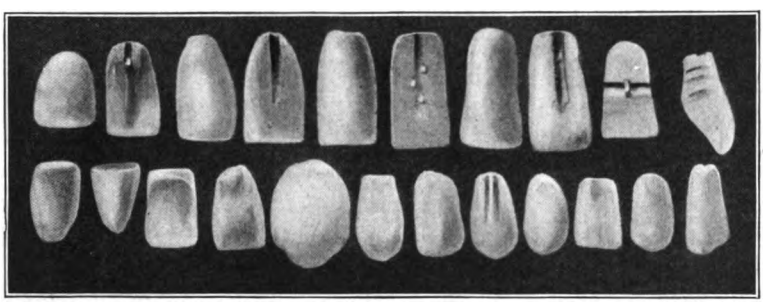

FIG. 25.—Earliest specimens of mineral teeth.

able to wear. Elated by this new success, Duchateau attempted to make teeth for persons of high rank and gain money thereby, but his lack of knowledge of dentistry prevented him from succeeding. Duchateau gave up in discouragement, while Dubois de Chemant worked unceasingly to perfect this invention, combining Fontainebleau sand, alicant soda, marl and oxide of iron in order to give proper coloring and control shrinkage. He had access to the Government porcelain laboratory of France for recipes and experiments, and after making satisfactory dentures, published the results in 1788. In 1789 he made known his invention to the Academy of Sciences and the Faculty of Medicine of Paris, and obtained an inventor's patent from

Louis XVI. Dubois de Chemant wrote several pamphlets, both in England and in France, wherein he set forth the many advantages of mineral teeth.

Thus while Dubois de Chement was not the inventor, he justly deserves the credit for perfecting and placing before the profession this valuable invention. These teeth were made in one single block representing teeth and gums, and were made from casts of the parts in such a manner as to control shrinkage, so that the fit was perfect. It remained for Fonzi, in 1808, to make known a new tooth which he called "terro-metallic," in which each tooth was single, with platina hooks to be attached to a base, and he also succeeded in improving the color of the teeth and imparting a semi-transparent or translucent appearance to them.

Particular credit is due to several Americans for the vast improvements in porcelain teeth up to the present time. Although invented and used in France as early as 1774, it was not until 1817 that Plantou arrived in Philadelphia from Paris with a supply of porcelain teeth and engaged in the practice of dentistry. The teeth that he brought with him were of such form, color and material as would now be regarded with contempt, having the labial surfaces rounded and enamelled and the lingual surfaces perfectly flat, resembling a split bean more than a tooth.

Yankee ingenuity has ever been alert, and it was not long before the advantages of the "indestructible" tooth were recognized, as well as its shortcomings. A number of Americans began experiments looking to the improvement of these teeth, or engaged in their manufacture on a small scale, Philadelphia becoming the seat of this new industry.

The first to attain any prominence in this line was Samuel W. Stockton, who began experiments in 1825, and had built up a considerable business by 1830. His stock was kept in bottles, the modern method of carding teeth not being in use for many years thereafter.

Among those who manufactured teeth for their own use were Drs. McIlhenny in 1826, Ambler and Spooner in 1828, Flagg in 1830, S. Spooner in 1831, Harwood and Tucker

in 1833, Alcock and Allen in 1835. Then there was Dr. Elias Wildman, who began experiments in 1837, and is credited with some of the most important improvements in porcelain. He first produced and used purple of Cassius, by which the natural color of the gum could be reproduced.

Dr. S. S. White first learned the tooth manufacturing business in the office of his uncle, Samuel W. Stockton, and in 1844 went into business for himself. His business has been for many years the largest of its kind in the world. He was a shrewd business man and knew how to give the profession what it wanted and spared no effort to improve his product. Guerini says of him: "But the most brilliant results, as is well known, were obtained by the celebrated Samuel S. White who by an intelligent and persevering activity, dedicated almost exclusively to improving mineral teeth and to bringing them into general use, contributed vastly to the progress of modern dental art."

H. D. Justi has done much to perfect teeth and introduced many improvements in molds and shades, having at one time been one of S. S. White's mold makers, but resigned to enter the employ of Owen & Armstrong, and later went into business for himself.

Claudius Ash, of London, should not be forgotten in connection with the improvements in porcelain. He began business in England about the same time that Stockton did in Philadelphia, and has been the pioneer in that line in the Old World. The line of English tube teeth manufactured by this firm have a well-merited reputation, and in beauty are not excelled by any.

No one man or firm deserves all the credit for the vast improvements in porcelain, and it is not possible to give credit here to all who have done their bit. As Dr. Trueman has aptly said, "There is enough glory to go around—let all have a share."

The improvements in porcelain teeth with which these men are credited are many and various, including important advances along lines unknown to present-day practitioners. Many of these improvements naturally referred to the per-

fection of details, and included distinctions in shape in accordance with anatomical types; the gaining of strength with lessened bulk, of translucency without sacrificing strength; the reproduction of the manifold deviations from absolute uniformity—more especially in gum-sectional teeth which, from the introduction of the vulcanite (rubber) base about 1853, until after 1870 were more used than any other form.

CHAPTER V.

EARLY DENTISTRY IN THE AMERICAN COLONIES.

ALTHOUGH dentistry in some form had been practised from the most remote times in the Old World, where great progress had been made and the profession had, to a large extent, become separated from medicine, its introduction into America as a distinct professional calling seems to have been delayed for at least one hundred and fifty years after the landing of the Pilgrims at Plymouth Rock. The following quotation from Koch's *History of Dental Surgery* gives one a fair idea of conditions existing in the early American Colonies:

"That the Cavaliers of the Old Dominion, the Dutch along the Hudson or the Germans in Pennsylvania, in the early colonial days, received any operative attention in the care of their teeth by men especially devoted to this particular calling, or indulged in prosthetic substitution, is not established by any record now known; but the Pilgrim Fathers of Plymouth Colony appear to have treated their bodily welfare in this respect with the same considerate care and zeal as that actuating them in spiritual matters. In 1636 they brought into the colony from London some physicians, an apothecary and three barber-surgeons. No record of these barber-surgeons seems to be available, but owing to a singular catastrophe which overtook William Dinely, one of these, his name has been preserved. He was sent for in 1639 by a man living at Roxbury to come and relieve him from toothache, which was causing him intense suffering. The man sent his maid to show the way. Dinely and the girl were overtaken by a severe storm and lost their way. Several days after their bodies were found frozen to death."

Even though American dentistry was slow to get a start—due no doubt to the hardships of a new and rugged country, where the battles with the Indians on the one hand and the task of supplying food and shelter on the other left but little time for attention to dental ills—nevertheless, the seed once sown took root rapidly and America was soon destined to take the lead of all other nations, and it was here that dentistry reached its highest development.

James Mills advertised in the *New York Weekly Journal* of January 6, 1735, as follows: "Teeth drawn and old broken stumps taken out very safely and with much care by James Mills, who was instructed in that art by the late James Reading, deceased, so fam'd for drawing teeth. He is to be spoke with at his shop in the house of the deceased near the Old Slip Market."

Isaac Greenwood is reputed to have practised dentistry in Boston about 1750, and to have carved false teeth from hippopotamus tusks, using beeswax molds as his pattern. His father was the first professor of mathematics and natural history in Harvard College, at Cambridge, Mass. It has frequently been said that Josiah Flagg was the first native-born American dentist, but when the genealogy of the Greenwoods is examined it must be conceded that the claim is not well founded. Isaac Greenwood, of Boston, seems to be more justly entitled to this distinction, although Flagg was probably the first native-born dentist who especially and exclusively prepared himself for the practice of his profession. In 1860, Isaac John Greenwood gave the following information in regard to his family: "Isaac Greenwood, the Second, was the first practitioner of dentistry in Boston, as well as a mathematical instrument maker, ivory turner and umbrella manufacturer. He followed all of these pursuits at the same time and also made the first electric machine for Benjamin Franklin. He is said to have practised dentistry only in its prosthetic branch, a business naturally embraced by that of ivory-turner in those days." Isaac John Greenwood does not say how his grandfather obtained his knowledge of dentistry, except that in a por-

trait of him he is shown with his hand upon an open volume of Hunter's *Treatise upon the Human Teeth.*

James Daniel advertised, in 1766, to operate on the teeth, "The business so absolutely necessary in this City," although he was by trade a hairdresser and maker of wigs. That was not as unusual as it sounds, for investigation shows that the early dentist was and had been a man who followed some other trade or occupation and practised his art as a side line, just as the early colonial doctor was usually the barber or the apothecary.

Robert Wooffendale, an English dentist, who was instructed by Thomas Berdmore, dentist to King George III, arrived in America in October, 1766, and practised for a time in New York City and later in Philadelphia. He appears to have possessed considerable skill, which he advertised in the *Pennsylvania Chronicle* and *Universal Advertiser,* claiming that he, "Having received instructions from the present operator for the King's teeth, performs all operations upon the teeth, gums, sockets and palate; also fixes artificial teeth so as to escape discerning."

He is reputed to have made for a patient named William Walton, of New York, a full upper and lower set of artificial teeth, claimed by most authorities to have been the first full set made in America. He was married in 1767 to Martha Stevenson, and they removed to Jamaica, Long Island, where he spent most of his time, visiting New York once each week to care for his practice. It appears that the public did not properly appreciate his skill, as he returned to England in 1768 to become successor to Thomas Berdmore upon the latter's death. From Harris's *Dictionary of Dental Science* it is learned that he again returned to New York in 1795 and resumed his practice, but continued in that line for only two years more. He then retired with his family to his Long Island farm, leaving his professional business in charge of his son John, to whom he willed a case containing his dental instruments at the time of his death, which occurred at Jamaica, Long Island, in 1828.

A Mr. Hamilton advertised in the *New York Chronicle* of August 17, 1767, that his celebrated tincture would cure the most violent toothache in a few minutes. He guaranteed "No cure, no pay." He is known to have practised in Philadelphia and probably made trips to New York.

John Baker, in the same year in which Robert Wooffendale arrived in New York, inserted an advertisement in the *Boston News Letter*, January 29, 1767. On May 9, 1768, he advertised in the *New York Weekly Journal* that he "has given proof of his superior art to the principal nobility, gentry and others of Great Britain, France, Ireland and other principal places of Europe also to 2000 persons in Boston, and is now in this city at Mr. John Watson's." He went to Philadelphia later and retired to a farm on land now occupied by the Pennsylvania Railroad Station at Broad St. Owing to the growth of the city his property became very valuable, and at his death he willed the residue of his estate, about $1,500,000, to Trinity Charity Schools. His most noteworthy achievement seems to have been the teaching of his art to one Paul Revere, a silversmith of Boston, who later distinguished himself as the hero of the midnight ride:

"Thro' every Middlesex village and farm."

In America, as in Europe, early dentistry made much of transplanting teeth, and some of the early practitioners must have been adepts at the art. Such practice must also have been very remunerative, as there is an advertisement in *Rivington's Royal Gazette*, under date of August 31, 1782, offering four guineas for each sound front tooth.

In the West, as in the Eastern colonies, dentistry did not go with the early settlers, but followed later after the settlements were fairly well established.

Dr. William H. Kennicott was born in western New York in 1806 and removed to New Orleans in 1822, where he must have gained his knowledge of dentistry. He removed to Chicago in 1834, opening an office for the practice of dentistry at the Eagle Tavern. For some time he apparently had the field entirely to himself, but on October 21, 1842, he

placed an advertisement in the *Chicago Express* announcing his partnership with Dr. Bradley, "recently from New York," so that "the citizens of Chicago will be able to avail themselves of the well-established skill of Doct. Bradley during the absence of Doct. Kennicott to the country," which denotes that he spent at least a portion of his time traveling and caring for patients outside of Chicago. In the same paper referred to there is an advertisement by Dr. E. Judson, 98 Lake Street, showing that Chicago at that time had at least three dentists. In 1848, Dr. Kennicott had attained prominence in that city and was responsible for great improvements in the municipal water system. He remained in active practice until 1863, when he died of apoplexy.

On the Pacific Coast dentistry seems to have made even an earlier beginning, since the Hudson Bay Mission, founded at Vancouver, B. C., in 1824, is said to have carried a dentist named George Wellington, who remained there until 1836, and then returned to Europe. So far as we are able to learn there was no dentist on the Pacific Coast from then until 1844, when W. Dunning, a New York dentist, emigrated to Astoria, at the mouth of the Columbia River, and was soon joined by Dr. Adams from New Orleans. When gold was discovered in California, dentists along with others went there in considerable numbers, and the profession came to be well represented in that part of the country.

The Spanish settlements made a deep impress on the Pacific Coast which it is not now possible to trace. Dr. James J. Walsh, who has done much original research in medical history, states that he had undoubted evidence that the early settlers of Mexico established, about 1500, A. D., a medical school at Mexico City, and that a number of medical works were published there. There was not much intercourse between the East and West at that time, and dentistry seems to have developed in the West independently of the East, without, however, leaving much reliable data.

CHAPTER VI.

PIONEER AMERICAN DENTISTS.

Josiah Flagg (1764–1816).—Little is known of the early life of Josiah Flagg until at the age of eighteen years, when he was serving in the Continental Army. Here he met Joseph Le Maire and James Gardette, two proficient French dentists, and learned much of value from them. Flagg proved an apt pupil and soon became a skilful dentist, and after the war located in Boston, where he began to practice his profession. He advertised to do all kinds of dental operations, also to sew up hare-lip and to make gold plates and obturators, and sold tooth-brushes, powders, tinctures, mastics and chew sticks (Fig. 26). He was also recognized as a pioneer in placing gold fillings. During the War of 1812 he again entered the service as a privateersman and was captured and taken to London, where he was afterward paroled. During his sojourn in England he gained much valuable information from surgeons of renown, and many courtesies were shown him.

He became acquainted with Sir Astley Cooper, the famous English surgeon, of whom the story is told that failing one day to extract the tooth of a patient before a class of students at Guy's Hospital, he turned the patient over to Flagg, who was present, saying, "Perhaps our American friend, who is a skilled dentist, can assist us in this dilemma." Flagg arose, bowed to Cooper and to the class, and taking from his pocket a jeweler's graving tool (a favorite instrument in those days for removing teeth) he extracted the tooth so neatly and rapidly that it flew half-way across the room. Cooper, very much astonished, exclaimed, "Gentlemen, that was a marvelous feat! a most marvelous feat!" At the close of the war Flagg returned to Boston, but was shipwrecked in

JOSIAH

Surgeo

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every accomodation at his houſe, wher
Bruſhes, Maſtics, &c. warranted appro
ces :--Alſo Chew-ſticks, particularly uſ
and beautiful whiteneſs ; which Medic
tail, that they may be more extenſively
*** DR. *FLAGG*, has a method to
artificial Teeth, Gold Gums, Roofs,
perſonally.

☞

for Handſome

At No. 47, New

FIG. 26.—Copy of an advertisement of

the harbor, and hoping to recover from the effects of the exposure moved to Charleston, S. C., soon afterward, where he died, September 30, 1816, of yellow fever, which was prevalent there at that time.

Joseph Le Maire (1752–1834), mentioned as one of Josiah Flagg's instructors, came with the land forces of France and landed at Newport in 1780. He was a surgeon of considerable ability who had studied dentistry in Paris, and was an intimate friend of the Marquis de La fayette. He undertook to instruct others in the dental art, which may be said to be the beginning of dental instruction in America.

The following year, while in winter quarters with the allied armies near Providence, Rhode Island, he met James Gardette, a fellow-countryman, and Josiah Flagg, whom he instructed in the science and art of dentistry. Both of these men, then very young, afterward became leaders in their profession and contributed much toward the work which in later years was to make the youngest nation of all the most famous for her dentists.

Le Maire drifted to Philadelphia in 1784, where he advertised that he had successfully transplanted one hundred and twenty-three teeth in six months, and that he also "carved artificial teeth from blocks of ivory." As it is a matter of record that it often required two months before the patient could chew with transplanted teeth, it follows naturally that patients must have been patient indeed in those days.[1]

In 1787 Le Maire returned to his native land and resumed the practice of his profession in Paris. From then until 1824 he made several valuable contributions to dental literature on the anatomy, physiology and pathology of the teeth. His death occurred at Maisons-Alfort, France, in 1834, and closed a long career of usefulness. His name stands out in the annals of dental history as the pioneer dental preceptor of America, whose coming marked the beginning of dentistry as a profession in this country.

[1] Gardette, writing in 1827, says that all of these transplantatians were failures.

James Gardette (1756–1831) was born in France in 1756 and studied medicine two years in Paris, being especially instructed in dental operations by M. Le Roy de la Faudinière, a dentist of high repute. He later became a surgeon in the French Navy, dentistry being a necessary qualification of a French naval surgeon at that time. He came to this country with France's naval forces and is said to have been the first medically educated dentist in America, being a graduate of the Royal Medical School of Paris. During the winter of 1781–1782, while in winter quarters at Providence, R. I., he, Le Maire and Flagg formed a close friendship. Later, when the war was over, Gardette located first in New York in 1783, removing to Philadelphia in 1784.

Gardette was an inventive genius of high order. He is credited with having done away with the practice of maintaining artificial teeth by means of ligatures and to have devised the gold mortise plate, by which human teeth were securely held to the edge of the gold plate by gold rivets, permitting the tooth to rest on the gums. Gardette also relates several cases in his practice where patients had been able to wear plates without the aid of springs, as Fauchard had noted before. He also advocated the extraction of teeth in youthful subjects in order to permit the other teeth in a crowded jaw to regain proper alignment. In 1829 he returned to France, and died at Bordeaux in 1831.

John Greenwood (1760–1819), second son of Isaac the Second, was born in Boston, and after a very meager education became an apprentice, at the tender age of thirteen years, to his uncle, Thales Greenwood, a cabinet maker of Portland, Me. In May, 1775, he ran away and enlisted in the Continental Army in Captain Bliss's company for eight months, at eight dollars per month, as a fifer. He subsequently reënlisted and served until the close of the war—first in the army, where he was captured, and later in the navy, where he suffered shipwreck. After the war he went to New York City, and after applying to his brother Clark, who was then practising dentistry, for aid, which was refused,

started in business as a mathematical instrument maker. Being a skilled mechanic and frequently called upon to extract teeth, he turned to the practice of dentistry with a determination to master its problems, and soon attained such success that he employed his brother Clark as his assistant. He probably gained all of his preliminary knowledge of dentistry from his father and brothers who practised the art before him. He advertised in the *Daily Advertiser*, February 28, 1786, as follows: "John Greenwood, dentist, No. 199 Water Street, Encouraged by the success of his practice, begs leave to acquaint the publick that he preserves the Teeth and Gums by removing an infectious tarter, etc."

Two years prior to beginning practice in New York City his advertisement in *Rivington's Royal Gazette*, of New York, August 24, 28 and 31, 1782, read:

"Teeth—Any person who is willing to dispose of his front teeth may hear of a purchaser by applying to Number 28 Maiden Lane, for which a generous price will be given. N. B. —Four Guineas will be given for every tooth."

These teeth were evidently used for transplanting. John Greenwood went abroad about 1806 and visited Paris, where he sought to purchase a keg of natural human teeth.

He also entered upon the field of oral surgery, performing operations on the antrum. So famous did he become that he attracted the attention of General George Washington, whose family dentist he became, and he made several sets of artificial teeth for this noted statesman. These teeth were carved from hippopotamus ivory and were held in place by spiral springs. He is said to be the first dentist to have used spiral springs in America at least, the flat springs having been previously used, though N. Dubois de Chemant is generally credited with having used the spiral springs in France.

General Washington frequently had occasion to consult his surgeon-dentist, who gave him remarkably good advice regarding his plates and the manner of their preservation, as will be seen from one of his letters.

"New York, Dec. 28, 1798.

"Sir: I send you enclosed two setts of teeth, one fixed on the old barrs in part, and the sett you sent me from Philadelphia, which, when I received, was very black, occasioned either by your soaking them in port wine, or by your drinking it. Port wine being sour takes off all polish and all acid has a tendency to soften every kind of teeth and bone. Acid is used in coloring every kind of ivory, therefore it is very pernicious to the teeth. I advise you to either take them out after dinner and put them in clean water and put in another sett, or clean them with a brush and some chalk scraped fine. It will absorb the acids which collect from the mouth and preserve them longer. I have found another and better way of using the sealing-wax when holes are eaten in the teeth by acid, etc. First observe and dry the teeth, then take a piece of wax and cut into small pieces as you think will fill up the whole; then take a large nail or any other piece of iron and heat it hot into the fire, then put your piece of wax into the hole and melt it by means of introducing the point of the nail to it. I have tried it and found it to consolidate, and do better than the other way, and if done proper it will resist the saliva. It will be handier for you to take hold of the nail with small plyers than with tongs thus, the wax must be very small, not bigger than this (*). If your teeth grow black take some chalk and a pine or cedar stick, it will rub off. If you want your teeth more yellow, soak them in broth or pot liquor, but not in tea or acids. Porter is a good thing to color them and will not hurt but preserve them, but it must not be in the least pricked; you will find I have altered the upper teeth you sent me from Philadelphia. Leaving the enamel on the teeth don't preserve them any longer than if it was off, only holds the color better, but to preserve them they must be very often changed and cleaned, for whatever attacks them must be repelled as often, or it will gain ground and destroy the works. The two setts I repaired is done on a different plan when they are done when made entirely new, for the teeth are screwed on the barrs, instead of having the barrs cast red hot on them, which is the reason, I believe, they destroy or dissolve so soon near the barrs.

"Sir, after hoping you will not be obliged to be troubled very soon in the same way, I subscribe myself,

"Your very humble servant,

"John Greenwood.

"Sir, the additional charge is fifteen dollars.

"P. S.—I expect next spring to move my family into Connecticut State. If I do I will write and let you know, and whether I give up my present business or not I will, as long as I live, do anything in this way for you if you require it."

On January 6, General Washington wrote as follows in reply to the above letter:

"MOUNT VERNON, 6th JAN., 1799.

"Sir: Your letter of the 28 ult., with a parcel that accompanied it, came safe to hand, and I feel obliged for your attention to my request, and for the directions you have given me.

"Enclosed you have bank-notes for fifteen dollars, which I shall be glad to hear has got safe to your hands. If you should return to Connecticut, I should be glad to be advised of it; and to what place, as shall always prefer your services to that of any other in the line of your present profession.

"I am, Sir,

"Your very humble servant,

"G. WASHINGTON."

There was buried in the tomb at Mt. Vernon, in the mouth of General George Washington, a double set of false teeth made by John Greenwood in 1799. They were made with gums of ivory and from molds of beeswax. Another set is on display in the museum of the Baltimore College of Dental Surgery.

John Greenwood was also the preceptor of Dr. Horace H. Hayden, of later fame, and his knowledge and skill contributed much to the early advancement of his profession. He died November 16, 1819, at the age of fifty-nine years, and was succeeded in practice by his two sons.

Isaac John Greenwood, son of John Greenwood, claimed to have used a steel bur in a lathe about 1823, which was his own invention for carving plates, and to have been the first to use wooden pivots in bone or mineral teeth. He was also the first to have mineral teeth prepared with holes in them to receive the wooden pivots. He credited his father, John

Greenwood, with being the first to use a foot-drill, constructed out of an old spinning-wheel belonging to his grandfather. This he himself used for twenty years after his father's death. The hand-bow drill of the jeweler, he states, was well known and generally used prior to that time. (Fauchard described a machine for preparing cavities in 1728.)

Edward Hudson (1772–1833), one of the early Philadelphia dentists, was born in Ireland in 1772. When a child he was adopted by his cousin (or uncle), Dr. Hudson, a talented

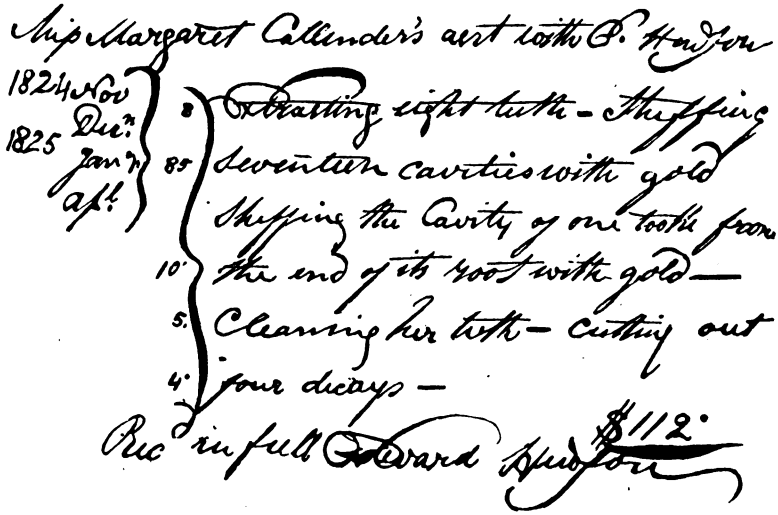

FIG. 27.—Bill rendered to Miss Margaret Callender by Edward Hudson in 1825.

dentist of Dublin, who educated him at Trinity College and later taught him dentistry in his private office. While in college Edward Hudson became an able debater and was intimately acquainted with Robert Emmet, the patriot, Thomas Moore, the poet, and Arthur O'Connor, all of whom were active in Irish politics and in the Emmet Conspiracy. Hudson became involved in the political uprisings of the day, was arrested and placed in Kilmainham jail and later taken to Fort George, Scotland, where he remained from 1798 until 1802. While in prison he practised dentistry for

the nobility and gentry, who paid him large fees. When he was finally released, in 1802, he was exiled to Holland, but soon afterward embarked for America, arriving at Philadelphia in 1803. Here he married, in 1804, and went into the stationery and book-selling business, but soon failed. He then tried brewing, with the same result, and finally returned to the practice of his profession, which he followed with great success. He should never have abandoned this calling in the first instance, as may be deduced from the fees he received, as shown in a facsimile of one of his bills here reproduced.

For more than thirty years Dr. Hudson was prominent socially and professionally. His popularity seems to have been more the result of his connection with Irish politics than of any great contribution to the art he practised, though he is said to have been a very skilful dentist. By some writers Hudson is claimed to have been the originator of root-canal filling. Dr. Robert Arthur says that "Hudson practised pulp extirpation in 1809 and the filling of the roots of front teeth to the apex with gold." It is known, however, that Bourdet did the same thing in 1757.

Hudson was highly eulogized by Drs. Chapin A. Harris and Eleazer Parmly, who extolled him for his noble traits of character. His honesty and upright dealing appear to have won for him the confidence of both the profession and laity.

His death occurred January 3, 1833, in the sixtieth year of his age. He died as he had lived, a lover of freedom in the land of his birth and an honored member of the profession in the land of his adoption.

CHAPTER VII.

ARCHITECTS OF AMERICAN DENTISTRY AS A SEPARATE PROFESSION—EARLY PART OF THE NINETEENTH CENTURY.

DURING the nineteenth century dentists began a campaign of education regarding the importance of the teeth and their care. Many brochures and books on the subject were published during this period, and these undoubtedly contributed to the possibilities of dentistry and stimulated new men to enter the profession. Itinerant dentists and quacks were strongly condemned and people were urged to apply rather to resident dentists who were known to be reliable.

There are several men at the beginning of the nineteenth century who might be styled the architects of dentistry as a separate calling and profession, for though dentistry is so closely related to medicine, it had its origin and growth entirely separate therefrom, at least so far as its development in America is concerned. Many of these pioneer dentists, however, had enjoyed the advantage of a medical education, which better fitted them for their work. Dentistry as a profession was left to thrive as it may, and often met contempt from the medical profession, and was forced to be self-creative, to apply the sciences and arts, to write its own books and to create its own nomenclature. Thus it has steadily progressed until today it is recognized by our government as occupying a position of equal rank with the medical profession, and stands forth with a record both in war and peace of which it may well be proud. The names of a few of the men who helped to make dentistry what it is today will be considered.

Horace H. Hayden, who was born at Windsor, Conn., in 1769, exerted an influence so noble and worked so indefatigably for the uplift of dentistry that his efforts were only

equalled by his co-worker, Chapin A. Harris. His work demands more than passing notice, for though he has long been dead the forces he set in motion will be felt so long as dentistry shall be a necessity.

When fourteen years of age he made a voyage to the West Indies as a cabin boy. Later he became apprenticed to an architect, and for several years thereafter followed this vocation. When he was about twenty-five years old he visited John Greenwood for dental services while in New York, and admiring Dr. Greenwood's skill he there conceived the idea of studying dentistry. He secured such books and information as were obtainable and studied hard for several years. Being possessed of mechanical skill he acquired considerable ability in his chosen profession, and finally established himself in Baltimore about the year 1800. Without friends, influence or money he opened a dental office and was soon conducting a successful practice. He became convinced that dentistry was worthy of higher public esteem than it enjoyed, and that this could only be achieved by better scientific training. He accordingly studied medicine at the University of Maryland while continuing to practice dentistry. He delved into physiological and pathological research, making new discoveries, especially investigating the functions of the thyroid, salivary, lacrimal and other glands of the human system. His indomitable earnestness and natural aptitude soon put him on the high road to success, and before long he became the teacher of a class in dentistry.

In 1825, he delivered a course of lectures on dentistry to the medical class at the University of Maryland, and in the meantime wrote many essays on dentistry for medical journals. He began as early as 1817 to advocate a dental association, but his efforts were unsuccessful until 1840, when, assisted by Dr. Harris and a few other earnest and determined dentists, a meeting was called in New York City, and the American Society of Dental Surgeons was founded. He was chosen its first president at the age of seventy, and served in that capacity until his death in 1844.

In 1841 he, with the aid of others, was successful in establishing the *American Journal of Dental Science* as the official organ of the American Society of Dental Surgeons, it having been published as a private enterprise since June, 1839, by Dr. Harris. This was the first dental journal ever published. In 1839, Hayden, with the aid of Chapin A. Harris and others, founded the Baltimore College of Dental Surgery, the first and oldest dental college in the world. Dr. Hayden was its first president and lectured on the principles of dental science and later on dental physiology and pathology. He was one of the founders and vice-president of the Maryland Academy of Science, and a geologist and botanist of note. To him may justly be attributed the title of "Father of American Dental Science."

On June 25, 1910, a monument was dedicated to Dr. Hayden at his birthplace, Windsor, Conn., as a memorial to his important work.

Chapin A. Harris, who ranks with Horace H. Hayden in dental achievement, was born at Pompey, Onondaga County, New York, May 6, 1806. At the age of seventeen he removed to Madison, Ohio, where his older brothers, James and John, had already settled. He studied medicine under the tutorship of his brother John about 1824, and later was duly licensed to practice the same. In 1827, he began to give attention to the practice of dental surgery and gathered around him several students, among whom was Dr. James Taylor. He practised for a time in Greenfield, Ohio, but removed to Bloomfield in 1828, where he continued the practice of medicine and dentistry. He next located in Fredericksburg, Va., where he devoted all of his time to dentistry, and in 1835 settled permanently in Baltimore, Md. In 1837, Harris delivered a course of lectures to the medical class of the University of Maryland. He contributed many articles to medical journals, and in 1839 published his first book, entitled *The Dental Art, a Practical Treatise on Dental Surgery*, consisting of three hundred and eighty-five pages and three lithographic plates. A second edition, published in 1845 under the title *Principles and Practice of Dental*

Surgery, contained six hundred pages and sixty-nine wood engravings. This work was a masterly treatise, covering all branches of dental surgery, and many of the principles therein set forth are as applicable at the present time as when the book was written. The immense popularity of this work is shown by the fact that it went through thirteen editions, the last in 1896, a record probably not equalled by a dental work before or since. He also published, in 1849, a *Dictionary of Dental Science*, which went through five editions, the last in 1898. All of the later editions of these works have been edited by Dr. F. J. S. Gorgas. He revised and translated from the French many works of note and published them in the *American Journal of Dental Science*. These constituted *The American Library of Dental Science*, and were published in connection with the *Journal* through the first series from 1839 to 1849. When the *Journal* was taken over, in 1840, by the American Society of Dental Surgeons the title was changed to the *American Journal and Library of Dental Science*, because of the addition of this material to its pages.

Harris was instrumental in establishing *The American Journal of Dental Science* in 1839, and was its chief editor for ten years. Subsequently he bought the magazine, which had always been a burden to the American Society of Dental Surgeons, and conducted it as a new series and private enterprise until his death. He was also Hayden's right-hand man in organizing the first dental society, in 1840, and became its first corresponding secretary.

Hayden and Harris worked untiringly to establish a school for dentists and met with much opposition and discouragement from the medical colleges and profession, being told by the faculty of the University of Maryland that "The subject of dentistry was of little consequence and thus justified their unfavorable action." Nothing daunted, they finally received the support of a few dentists and public-spirited citizens, and in 1839 secured a charter for the Baltimore College of Dental Surgery. Dr. Harris was its first dean, Dr. Hayden serving as president. Although the first dental

college was established in Baltimore it was fostered by prominent dentists in New York and elsewhere. Dr. Harris lectured on operative and prosthetic dentistry and became president of the college after Dr. Hayden's death in 1844. When the American Society of Dental Surgeons was about to become disrupted, Harris became one of the foremost organizers of the American Dental Convention and served as president of that body in 1856–1857.

Dr. Harris was a devout Christian, a lover of animals and a devoted husband and father. He had a good income, with which he was more than generous, having brought up and educated nine children besides his own. Like many public-spirited men, he left his own family in straitened circumstances by his untimely death, which occurred September 29, 1860, from overwork, in the period of his greatest usefulness.

Dentistry under the potent influence of Hayden and Harris ceased to be a desultory trade or calling and attained the dignity of a recognized profession. It was the ripe thought and experience of Dr. Hayden combined with the unlimited activity and power for work of the youthful Dr. Harris that produced results of untold benefit to humanity and placed "American dentistry" (not the kind advertised in Europe) in the enviable position it occupies today.

In recent years bronze tablets to the memory of Hayden and Harris have been placed in the Baltimore College of Dental Surgery and the dental department of the University of Maryland, where both of these men had been pioneer teachers of dentistry.

Thomas E. Bond, A.M., M.D., born at Baltimore, November 5, 1813, was one of the founders of the Baltimore College of Dental Surgery. He was the son of a minister and physician, and graduated in 1834 from the medical department of the University of Maryland. In 1839 he became associated with Drs. Horace H. Hayden, Chapin A. Harris and H. Willis Baxley in organizing the Baltimore College of Dental Surgery and was named professor of special pathology and therapeutics, which chair he held until his death in 1872. He was dean of the faculty from 1842 to 1849.

The first class of the college was held in the upper story of an old warehouse and consisted of twelve students, whom Dr. Bond wittily dubbed "the twelve apostles." Some of them later became apostles indeed. It was Dr. Bond who at that early date fought for the recognition of dentistry as being entitled to equality with other branches of medicine. He was also the pioneer in Baltimore in conducting experiments with chloroform, administering it to a patient of Dr. Harris for the extraction of a tooth.

As a teacher Dr. Bond was led to write and publish a book entitled *A Practical Treatise on Dental Medicine*, and also translated several dental works from the French into English. He served also as professor of materia medica, therapeutics and hygiene in the Washington Medical University of Baltimore, as well as editor of several religious papers of the Methodist Episcopal faith.

James Taylor, the subject of this sketch, was born in 1809 on a farm near Bainbridge, Ohio, where his parents had settled in 1801 as pioneers. He had to encounter great obstacles to obtain an education on account of the limited resources of the country, for at that time it is said that wheat sold for thirty cents a bushel and corn for ten cents, if indeed they could be sold at all. His father was a school commissioner, and several New England school teachers boarded at his home. A literary taste was cultivated in the children and a good education was acquired. At the age of seventeen James chose medicine as his profession, and, after taking up the study of anatomy and physiology, was soon a student of Dr. John Harris. Dr. Harris had already begun to take a lively interest in dentistry, and soon thereafter both began to practice the dental art. Sometime later Dr. Taylor made various trips to the South on mercantile business, in which he was unsuccessful. After a varied career he finally located in Cincinnati, Ohio, in 1842, where he took up his old profession and built up a lucrative practice. Inspired by the success of his old friend Chapin A. Harris, he with the help of Drs. Jesse W. Cook, John Allen and M. Rogers succeeded in establishing the Ohio College of Dental Surgery, of which

he was the first dean and professor of practical dentistry and pharmacy. This was the second dental college to be established in the world's history, and thus another stone was laid by the "Architects of American dentistry."

After three years Dr. Taylor assumed the chair of principles and practice of dental surgery, which he held for eighteen years, when he retired as emeritus professor.

Dr. Taylor was one of the originators and leading members of the Mississippi Valley Association of Dental Surgeons, serving as president of that association in 1849–1850. He was also elected president of the American Dental Convention in 1856. He served as a member of the publishing committee and editor of the *Dental Register of the West*, and made many valuable contributions to that magazine and to the *American Journal of Dental Science*. He was one of the men who opposed and refused to sign "the amalgam pledge" of the American Society of Dental Surgeons. After an honorable and successful career he died, June 12, 1881, but not until he had added another epochal chapter to the history of dentistry.

Leonard Koecker, pioneer dentist and author, built up a lucrative practice on no greater initial training than that derived from close personal acquaintance with a Hebrew traveling dentist and peddler. He was born in Bremen, Germany, in 1785, came to this country in 1807 at the age of twenty-two years and located in Baltimore, where for lack of employment he was forced to resort to his meager knowledge of dentistry. He opened a dental office, hoping to add to his limited knowledge as his practice increased. It is related of him that the first time he attempted to extract a tooth he closed his eyes, averted his head and pulled so excitedly that when the tooth came out he could not tell whether that had really happened or whether he had broken the patient's jaw. However, the patient was much pleased, saying that he had never had a tooth extracted so easily, and from his influence Koecker's practice soon reached the then enormous sum of $8000 per year. He removed to Philadelphia, and on account of failing health gave up his

practice in 1822. After several years he was again on the high road to success in London, having in the meantime had letters of introduction from some of the foremost statesmen of America to men of high rank in England.

In 1826, he published his *Principles of Dental Surgery*, which was far in advance of any similar work previously published. He was the author of many other works of note, and may be truly regarded as one of the founders of American dentistry, since his writings, though first published in London, were extensively used in America. Koecker also had many advanced ideas in regard to performing operations. He designed and made his own instruments and mastered several languages so that he might add to his store of knowledge. He died in London, August 8, 1850, after conducting a successful practice there for twenty-eight years.

Elisha Townsend was born in Philadelphia July 16, 1804, and after finishing his education learned the trade of watchmaker with his father. He went on the stage, but not finding it to his liking returned to Philadelphia in 1832 and took up the study of dentistry. He began to practise in West Chester, near Philadelphia, returning later to Philadelphia and locating near Dr. Edward Hudson, from whom he learned much of value. Townsend was a pioneer gold worker, and used to place his gold in the oven overnight, though he could not explain why he did so except that it worked better. It is doubtful if he ever made use of the cohesive properties of gold knowingly. The driving off of the gases from the surface of the gold by this process, as made known by Dr. G. V. Black, would no doubt render it sticky, a quality generally considered objectionable in those days.

He took an active part in organizing the American Society of Dental Surgeons in 1840, serving as its first vice-president in 1852–1853, being elected president in 1853–1854 and serving in that capacity until the society disbanded in 1856. When it became apparent that this body would be disrupted, he became one of the prime organizers of the American Dental Convention in 1855, and served as its recording secretary in 1856–1857.

He aided in organizing the Philadelphia College of Dental Surgery in 1852, and was chosen its first dean and professor of operative dentistry. In 1856, he with the rest of the faculty resigned on account of a dispute in regard to the granting of degrees, and the Pennsylvania College of Dental Surgery was chartered and organized by them, he holding the same chair as before.[1]

He experimented with and wrote articles on amalgam fillings, and was the first to publish a formula (4 parts pure silver and 5 parts pure tin), though he gave credit for the formula to Dr. W. M. Hunter, of Cincinnati. He was not, however, an advocate of amalgam, and in his later writings condemned it entirely. On account of failing health he went to London, where he died October 13, 1858.

Eleazer Parmly was born in Braintree, Vt., March 13, 1797. He was studious and apt, and at sixteen years of age passed a school-teacher's examination. By the age of seventeen he had mastered the printer's trade in Montreal, Canada, and followed this occupation for four years. At twenty-one he began the study of dentistry with his elder brother, Levi Spear Parmly, a young dentist of Boston, who in turn had studied under Dr. Petrie and Dr. John Randall, of Boston. In quest of further knowledge, Eleazer Parmly made a tour of the United States for four years, performing dental operations wherever he went. In 1820 he embarked for London in quest of books and further knowledge. He went to Paris later for the same purpose, returning to London to join with his brother Levi Spear Parmly in the practice of dentistry. He very quickly attained prominence there, but his health failed, and in 1823 he returned to America and located in New York, where he was a leader of his profession for thirty years.

Dr. Parmly was bitterly opposed to all forms of mineral paste or amalgam, and declared that gold is the only permanent stopping for teeth. He was associated with Horace H. Hayden and Chapin A. Harris in establishing the *American*

[1] See account of Pennsylvania College of Dental Surgery.

Journal of Dental Science and the Baltimore College of Dental Surgery, of which he was provost from 1847 to 1852. He was president of the New York College of Dentistry in 1867–1868, and first president of a college faculty association, organized at Philadelphia, October 17, 1866.

He wrote many works of note and republished Hunter's *Treatise on the Teeth.* Late in life he traveled extensively and was entertained by Napoleon III and Empress Eugenie, Pope Pius IX and other noted men. His home was the mecca of distinguished literary people. He was an intimate friend of Abraham Lincoln and a frequent visitor at the White House. He was a successful business man, which few dentists are, and left an estate of $3,000,000, acquired through a rise in real estate values in New York City.

Dr. Parmly was conspicuous for his desire to marry Miss Mary Astor, the only daughter of the head of the old John Jacob Astor family, but was frustrated by that stern parent, who succeeded in taking his daughter in haste to his chateau in Switzerland and marrying her against her will to a nobleman, Baron von Romph. Miss Astor afterward held a tearful interview with Dr. Parmly and departed for Germany, where some months later she died of a broken heart.

Dr. Parmly died of pneumonia in New York, December 13, 1874, aged seventy-seven years.

Solyman Brown, A.M., D.D., M.D., D.D.S., was born at Litchfield, Conn., November 17, 1790, of Puritan parentage. He graduated from Yale College in 1812, after which he combined the duties of minister of the gospel and school teacher for about twenty years. In 1832 he met Eleazer Parmly and soon became associated with him in a literary way and also in the practice of dentistry. He wrote much and was a poet of some note. One of his poems, entitled *Dentologia,* written in 1833, on diseases of the teeth and their remedies, attracted wide attention, and another, *A Portrait of a Young Lady in Verse* is quoted in part here, to show his literary style as well as the high esteem in which he held his profession:

"When first I saw her eyes' celestial blue,
Her cheeks' vermilion, and the carmine hue,
That melted on her lips:—her auburn hair
That floated playful on the yielding air:
And then that neck within those graceful curls,
Molten from Cleopatra's liquid pearls;
I whispered to my heart—we'll fondly seek
The means, the hour, to hear the angel speak;
For sure such language from those lips must flow,
As none but pure and seraph natures know.

"'Twas said—'twas done—the fit occasion came,
As if to quench betimes the kindling flame
Of love and admiration—for she spoke,
And lo! the heavenly spell forever broke.
The fancied angel vanished into air,
And left unfortunate Urilla there:
For when her parted lips disclosed to view,
Those ruined arches, veiled in ebon hue,
Where love had thought to feast the ravished sight
Of orient gems reflecting snowy light,
Hope, disappointed, silently retired,
Disgust triumphant came, and love expired!

"Let every fair one shun Urilla's fate,
And awake to action, ere it be too late;—
Let each successive day unfailing bring
The brush, the dentifrice, and, from the spring,
The cleansing flood—the labor will be small,
Or, if her past neglect preclude relief,
By gentle means like these, assuage her grief;
The dental art can remedy the ill,
Restore her hopes, and make her lovely still."

Dental Hygeia, another poem in blank verse on the health and preservation of the teeth, was written by him in 1838 and dedicated to his brother, Dr. A. Woodruff Brown. This poem was considered by many to be equal or superior to *Dentologia*. He wrote many other poems and books of note and was a regular contributor to the *American Journal of Dental Science*, and aided in establishing that journal as well as the first dental college. To Dr. Brown belongs the credit of first suggesting an independent dental college after

the medical colleges had refused to teach dentistry. Dr. Brown was a charter member of the American Society of Dental Surgeons and its recording secretary for the first five years. He practised dentistry for twenty-eight years, and then, on account of failing eyesight and after a few years of a varied career, became a minister of the gospel again at the age of seventy, and continued in that capacity until his death, which occurred February 13, 1876, at the age of eighty-six years.

CHAPTER VIII.

BIOGRAPHIES OF OTHER NOTED AMERICAN DENTISTS OF THE NINETEENTH CENTURY.

Nathan Cooley Keep, M.D., D.M.D., was born in Long Meadow, Mass., December 23, 1800. After obtaining a limited education, at about the age of fifteen he went to Newark, N. J., and was apprenticed to John Taylor, a manufacturing jeweler, where he developed unusual skill in the handling of tools and working in metals. Dr. Keep received his practical training in dentistry from Dr. John Randall, of Boston, at the age of twenty-one, and later attended lectures and graduated in medicine at Harvard University in 1827, while still practising his profession. He was a broad-minded man and was soon laboring to make dentistry a liberal profession.

He helped to perfect porcelain teeth in America and otherwise developed many new ideas. It is said that Dr. Keep and Dr. J. F. Flagg paid $1000 to a smooth-talking little Frenchman, who promised to teach them the secret of making porcelain teeth; but they soon found that little information was to be derived from him, so went on with their experiments alone with such zeal that they set fire to their workshop.

Dr. Keep cherished the hope that some day he would be instrumental in establishing a college for the training of dentists in the New England States. Unlike his predecessors he favored a thorough and united medical and dental education and was not in favor of divorcing the two professions as had hitherto been done, but advocated the degree of M.D. for dental practitioners. Dr. Keep was largely responsible for the establishment of the Harvard Dental School in

1867, the formal opening being in 1868. He was its first dean and professor of mechanical dentistry. A dental museum, in which rare specimens could be collected and kept, was also established in connection with the college by Dr. Keep. He was a charter member of the American Society of Dental Surgeons and a member of its first executive committee. When the Massachusetts Dental Society was organized Dr. Keep was the only one of the older practitioners who came in with the younger men and assisted in its organization, and was its president from 1864 until 1866.

It was Dr. Keep who, when Prof. John W. Webster was on trial for murder, identified the victim, Dr. Parkman, an old friend of his, by means of dental work he had placed in his mouth.

Dr. Keep was a kind-hearted and gentle person and much loved by his professional brethren and the public. He was an invalid for several years prior to his death, which occurred March 11, 1875, in his seventy-fifth year.

Edward Maynard, the noted inventor of Washington, D. C., without an account of whom the history of dentistry would not be complete, was born in Madison, N. Y., April 26, 1813. He acquired his early education in the village school and at Hamilton Academy and received an appointment as cadet to the Military Academy at West Point in 1831, but being of delicate health was compelled to resign the same year. He then studied civil engineering, law, drawing, architecture and anatomy, but in 1835 adopted dentistry as his profession, becoming associated with a dentist in Utica, N. Y. He prided himself on his ability to make all of his own instruments and was as skilful in forging and welding iron and steel as in working gold.

In 1836, he located in Washington, D. C., where he practised dentistry until 1890. During his career he distinguished himself by several valuable discoveries and inventions. He was the first to announce the existence of dental fibrils in teeth. He invented the Maynard improved drill for preparing cavities, which was the best of its kind, and also perfected a system of non-cohesive gold filling. He is said

to have been the first to invent and use barbed broaches for pulp extirpation, using for this purpose a watch-spring filed down to the fineness of a horsehair. He performed this operation at St. Petersburg in 1845, and so impressed Czar Nicholas that the latter offered to make him Actual Dentist to His Imperial Majesty. He refused this offer, returning to Washington, where he had built up a very select practice among government officials and the wealthier classes. In 1863, he became impressed with the need of a dental corps for the army and navy and made an effort toward their establishment. By invitation of the Secretary of War he was chosen to make experiments in regard to the manufacture of Damascus steel. In 1845, Dr. Maynard patented a system of priming for firearms to take the place of the percussion cap, which invention was adopted by the government. In 1851, he patented a breech-loading rifle, which with further improvements, patented in 1859, is known the world over as the Maynard rifle, the first breech-loading gun that proved equal to the best muzzle-loading weapons. In 1856, he patented the first metallic cartridge suitable for use in his rifle and in 1860 a method of converting muzzle-loading arms into breech-loaders; in 1868 another patent was secured on a method for the expansion of a heated gun-barrel independent of the other barrel. Many other valuable patents were granted to him, showing that dentists can and have done other notable things besides practising their profession. Dr. Maynard retired from practice on account of ill health in 1890, and died May 4, 1891, in Washington, D. C., where his remains were interred in the Congressional Cemetery.

Benjamin Adolph Rodrigues, who was born at Charleston, S. C., in 1815, read medicine under Dr. H. Frost and later studied dentistry under C. Starr Brewster, who practised for the most cultured residents of Charleston. He succeeded to Dr. Brewster's practice in 1833, when the latter went to Europe, and also studied medicine at the Medical College of South Carolina, graduating as M.D. in 1834. He became a writer of note and a student of the arts and theology as well as a leader in his profession. He was a member of the

American Society of Dental Surgeons and later of the American Dental Convention, which he served as vice-president in 1860. He died of apoplexy October 19, 1871, at the age of fifty-eight.

Robert Arthur was born at Calverton, Md., July 22, 1819, and after obtaining a good classical education studied dentistry, being a member of the first graduating class of the Baltimore College of Dental Surgery. He and Dr. Mackall were the first on whom the D.D.S. degree was conferred for the successful completion of a course of study in dentistry, the date being March 9, 1841. Dr. Arthur began the practice of dentistry in Baltimore in 1846, later removing to Philadelphia, then to Washington, D. C., where he was very successful, in the meantime spending his winters in Philadelphia. He became a member of the American Society of Dental Surgeons in 1841 and was active in organizing the Dental Association of Maryland, serving as its first president in 1866. He helped to organize the Philadelphia College of Dental Surgery in 1852 and was made professor of principles and practice of dental surgery, and three years later was elected dean. He was the originator of the system of prophylaxis known as "Arthurizing," or separating the teeth by filing away a portion of the approximal surfaces to prevent caries. The old method of filing a separation between the teeth to prevent or arrest caries was modified by Arthur to provide a small shoulder at the gum, presumably for its protection, but at the same time allowing a free excursion of the food over the filed surfaces. This method was used to arrest incipient caries, and it is probable that the method advocated by Arthur was not as radical as was generally supposed.

In 1857, he wrote *A Treatise on the Use of Adhesive Foil*, being the first to publish and make known the cohesive properties of gold, though many claimed to have made use of it before him.

After resigning his position as dean of the Philadelphia (then Pennsylvania) College of Dental Surgery in 1857, he returned permanently to Baltimore, his old home, where he

spent the remainder of his life, continuing his literary career until his death, June 22, 1880.

John M. Riggs, born at Seymore, Conn., October 25, 1811, deserves mention as the first American dentist to describe suppurative inflammation of the gums (called Riggs's disease) and to prescribe a correct treatment therefor by removing the tartar or deposits found on the necks and roots of the teeth. He is called the discoverer of this treatment, but he cannot be said to have been the first to describe the disease, as Fauchard did the same in 1746.

He was present and extracted a tooth for Dr. Horace Wells, December 11, 1844, under the influence of nitrous oxide administered by Prof. G. Q. Colton. Both Drs. Riggs and Wells used the gas in their practice for a short time thereafter, but not meeting with much success, discontinued its use. Dr. Riggs's death occurred November 11, 1885.

Samuel Stockton White was born in Hulmeville, Bucks County, Pa., June 19, 1822. He lost his father at the age of eight years and his mother moved to Burlington, N. J., remaining there until he was sixteen years of age, when he was indentured to his uncle, Samuel W. Stockton, of Philadelphia, who was then engaged in the manufacture of porcelain teeth. While working for his uncle he studied dentistry under Dr. J. De Haven White, a leading practitioner of the day, but not a relative. At the age of twenty-one he began the practice of dentistry in his uncle's office and at the same time superintended the latter's manufacturing department.

In the next year, 1844, he began the tooth manufacturing business for himself at 116 North Seventh Street, Philadelphia, and a short time later removed to 273 (old numbering) Race Street, above Eighth. At this time he began to handle other supplies needed by dentists and gave up the practice of dentistry to devote all of his time to his rapidly growing business. In 1849 he took in as partners Asahel Jones, of New York City, and John R. McCurdy, of Philadelphia; the firm name became Jones, White & McCurdy, and the business was removed to larger quarters on Arch Street

below Sixth. The product manufactured by this house soon attracted wide attention and many premiums and medals were awarded for the excellent quality of porcelain teeth produced. Branch houses were established in various cities from 1845 to 1858 to furnish an outlet for the firm's goods. In 1861 Dr. Samuel S. White again became the sole owner, having bought the interest of Mr. Jones and Mr. McCurdy.

When Secretary Chase called for the first loan to carry on the Civil War, Dr. White's name headed the list.

He began the publication of a quarterly dental journal, *The Dental News Letter*, in 1847. In August, 1859, this became a monthly journal with a new title, *The Dental Cosmos*, and is today one of our leading dental magazines.

Dr. White was a public-spirited man and took an active part in the fight which was waged between the Goodyear Dental Vulcanite Company and the dental profession. For seven years he fought this company, until it is said the mental strain of this, in addition to the cares of his business, brought on an attack of congestion of the brain in November, 1879. His physicians ordered him to Europe, but in December he contracted Russian influenza, then in its first violent outbreak, and died in Paris December 30, 1879.

His business was incorporated in 1881 and has since been conducted and known as the S. S. White Dental Manufacturing Company.

The following tribute is taken from Guerini's *History of Dentistry*, published in 1909:

"The credit of having introduced many new improvements in the manufacture of mineral teeth belongs especially to the Americans. Among those who particularly distinguished themselves in this department of dental art we may note Charles W. Peale, Samuel W. Stockton, James Alcock and Elias Wildman. But the most brilliant results, as is well known, were obtained by the celebrated Samuel S. White, who by an intelligent and persevering activity, dedicated almost exclusively to improving mineral teeth and bringing them into general use, contributed vastly to the progress of modern dental art."

CHAPTER IX.

NOTED TEACHERS, ORGANIZERS AND INVENTORS OF RECENT TIMES.

William Henry Morgan, born in Logan County, Kentucky, February 22, 1818, was a southern pioneer in dentistry. He graduated from the Baltimore College of Dental Surgery in 1848, and located at Russellville, Ky., and later at Nashville, Tenn., where he became associated first with Dr. T. D. Hamlin, and next with his oldest son, Henry William. He was chief organizer and first dean of the School of Dentistry of Vanderbilt University, which was organized in 1879. He was an efficient teacher, a writer of note and served the school faithfully for more than twenty years.

For nearly fifty years he conducted a large and exclusive dental practice and was a recognized leader of the dental profession in the South, and was widely known as an expert manipulator of gold-foil. He helped to organize the Southern Dental Association in 1869 and was president of the American Dental Association in 1870. He held several important positions as trustee for educational institutions at the time of his death, which occurred at his home in Nashville, May 16, 1901.

W. G. A. Bonwill was born in Camden, Del., October 4, 1833. He was from childhood a mechanical genius as well as an artist, and in 1853 he began the study of dentistry under Samuel W. Neall, of Camden, with the munificent sum of $125.00 to back his undertaking. After six months with Dr. Neall he went to Baltimore and studied operative dentistry under Dr. Chapin A. Harris for three months, and a year later began to practice his profession in Dover, Del., where he remained until 1871, when he removed to Philadelphia.

In 1876, he invented the diamond reamer for removing

or modifying contact points in a manner similar to that advocated by Dr. Robert Arthur. His fame as a gold worker was world-wide, and he was also a good amalgam worker. In 1874, he announced the invention of the electric mallet. His first dental engine, known as the Bonwill dental engine, was patented in 1877 and marketed in 1879. A little later he remodeled it for use in surgical work, and it is now as indispensable to the surgeon as to the dentist. Bone-surgery and trephining have been simplified and made easier by its use, making possible delicate operations that would have been difficult if not impossible without it. The oral surgeon often performs root and jaw resections by the use of this instrument. He was the first to employ bibulous paper to assist in keeping cavities dry while filling them, also corundum disks and the cervical matrix. He also devised a system of clasped partial dentures as a substitute for bridge-work. Another notable invention was his anatomical articulator, based on the equilateral triangle, which theory is still upheld by many able men. He made many notable inventions other than dental, among which grain reapers, shoe fasteners and the safety pin may be named. He was actively identified with dental society work and a prolific writer until death claimed him in 1899.

Sanford Christie Barnum was born at Oakland Valley, N. Y., August 24, 1838. He studied dentistry under his uncle and located at Monticello, N. Y., in 1862, returning to New York and graduating from the New York College of Dentistry in 1868. As early as 1862 he conceived the idea and made practical use of the rubber dam in dental operations. He donated it as a gift to the dental profession in 1864, foregoing his opportunity to make a fortune, and won world renown for his act. He was voted many medals and tokens of honor for his generosity. He died of chronic meningitis December 24, 1885, at the age of forty-seven years.

It is scarcely possible to estimate the advantage of his one great contribution to dentistry, without which many of our most delicate operations would be seriously handicapped if not impossible.

Benjamin Franklin Arrington was born in Nash County, N. C., September 11, 1827, graduated in medicine at Transylvania Medical College, Lexington, Ky., in 1848, and after practising medicine for a time went to Baltimore and graduated from the Baltimore College of Dental Surgery in 1853. Returning to North Carolina he practised at Windsor, Wilmington, Raleigh and Goldsboro, and traveled extensively in the South for the S. S. White Dental Manufacturing Company. He was mainly instrumental in organizing the Southern Dental Association at Atlanta, Ga., July 29, 1869, though he refused the presidency on the ground that he was not at that time actively practising dentistry. He was foremost in organizing the North Carolina Dental Society at Greensboro, September 5, 1866, and in 1875 was elected its president. His death occurred at Goldsboro, N. C., October 29, 1907.

Richard Bayley Winder, father of the National Association of Dental Faculties, was born in Eastville, Va., July 27, 1828. He was educated at Princeton University and the University of Virginia, and later engaged in farming in Accomac County, Va., until the Civil War, when he entered the Confederate Army as a major. Returning home without means he decided to study dentistry, graduated from the Baltimore College of Dental Surgery in 1869, at the age of forty-one years, and was for a time associated with Dr. F. J. S. Gorgas. In search of further knowledge he took a course of lectures and graduated as M.D. from the College of Physicians and Surgeons of Baltimore in 1873.

In the same year he succeeded in organizing the Maryland Dental College, of which he was the first dean and professor of physiology and hygiene. When this school was merged into the Baltimore College of Dental Surgery, in 1879, Dr. Winder was made professor of dental surgery and operative dentistry, and soon thereafter was made dean, which position he filled until his death, July 18, 1894.

The organization of the National Association of Dental Faculties, in 1884, was the result of Dr. Winder's efforts. He was also the first person after Dr. Thomas E. Bond to

advance the idea that dentistry should be recognized and placed on an equality with medicine by our government.

Thomas W. Evans, dental practitioner during his professional career to practically all the crowned heads of Europe, distinguished diplomat and philanthropist, was born in Philadelphia December 23, 1823.

In 1841, he began the study of dentistry under Dr. John DeHaven White, and attended lectures at Jefferson Medical College, Philadelphia, from which in due course he received the M.D. degree. He began dental practice in Maryland, and later moved to Lancaster, Pa., where he remained until 1847. During his stay in Lancaster he contributed a series of gold contour filling operations to an exhibition of arts and manufactures, held under the auspices of the Franklin Institute, Philadelphia, in the fall of 1847. For this he received a gold medal in recognition of the novelty and merit of his work. Dr. C. Starr Brewster, an American dentist practising in Paris, then on a visit to his home country, passing through the exhibition, noticed and was much impressed by the excellence of this work. He visited Dr. Evans and they arranged that he should accompany him on his return to Paris.

This association soon ripened into partnership and brought him into contact with the aristocratic element of French society. His professional skill and pleasing personality gained him many friends and his keen insight, diplomatic ability and sound judgment commanded respect and made him a much-sought counselor in matters of business and intricate affairs of state.

These characteristics won the confidence of Napoleon III, and they became firm friends. During the American Civil War the Emperor, desiring to know the exact condition of affairs so that he might shape the course of France in its relations with the United States, sent Dr. Evans to this country to ascertain the probable result of the conflict, and the latter's report caused France to remain neutral. Dr. Evans was especially active during the Franco-Prussian War in aiding the sufferers, and later, when at its disastrous end the Empress was compelled as best she might to force her way through

an angry mob and seek his home as an asylum, his quick wit and resourcefulness found a way to convoy her safely to England.

The crowning act of his life and his monument is the well-endowed Thomas W. Evans Museum and Dental Institute, the dental department of the University of Pennsylvania, provided for in his will, constituting the first liberal endowment for dental education.

Dr. Evans died in Paris November 14, 1897, in the seventy-fourth year of his age.

Norman W. Kingsley, artist and sculptor, was born at Stockholm, N. Y., October 26, 1829, being a descendant of Randolph de Kingslea, a Saxon keeper of the King's forest in the twelfth century. In 1848, he began the study of dentistry with his uncle, A. W. Kingsley, of Elizabeth, N. Y., graduating later from the Baltimore College of Dental Surgery. He located in Oswego in 1850 and removed from there to New York in 1852. He subsequently made the acquaintance of Dr. Eleazer Parmly, Solyman Brown and other prominent dentists, and attracted their attention to the excellence of his work. In 1859, he treated a case of cleft palate successfully, which drew favorable comment from far and wide, and for which he was awarded a gold medal by the American Dental Convention in 1863. He is accredited the "Father of Modern Orthodontia," having written the first book ever published on that subject. His writings between 1875 and 1881 are said to be some of the best yet published.

He deserves lasting fame for his bust of Christ, modeled in 1868, which is said to be the best work of its kind in existence. His paintings, carvings, embroidery, pyrographic and other works of art are justly celebrated. In 1853 he was awarded the highest prize for porcelain teeth at the World's Fair held in New York.

In 1865, he founded the New York College of Dentistry, becoming dean of the faculty and professor of dental art and mechanism. He died in Warren Point, N. Y., February 20, 1913, in his eighty-fourth year.

Willoughby D. Miller, though he spent most of his professional life abroad, should ever be remembered as one of dentistry's greatest benefactors. Born at Alexandria, Ohio, August 1, 1853, he secured a high-school education, graduated from the University of Michigan in 1875, and then went to Edinburgh to study chemistry, philosophy and mathematics. He next pursued his studies in Berlin, intending to follow the profession of physics. Here, through association with Dr. James Truman and Dr. Abbott, he became interested in dentistry, and the course of his whole life was changed. He entered the office of Dr. Abbott as a dental student, and in 1877–1878 studied dentistry one session at the Pennsylvania College of Dental Surgery. He then entered the newly organized dental department of the University of Pennsylvania, and graduated therefrom in 1879.

Dr. Miller became distinguished as a writer of marked ability, contributing more than one hundred scientific papers to the profession's literature. His most notable work, *The Microörganisms of the Human Mouth,* in which he discloses the relation of bacteria to dental caries, is so far the acknowledged authority on that subject. He was an apostle of oral prophylaxis and worked hard for the scientific uplifting of his profession.

Dr. Miller was dentist to the Empress of Germany and other members of the royal family, and though he held many positions of importance in Germany and throughout Europe, and had honors bestowed on him that no other American dentist ever had, he never once forgot or forsook his Americanism.

Soon after the death of Dr. Miller, July 28, 1907, the Fédération Dentaire Internationale began the collection of a memorial fund in his honor for the purpose of rewarding those who had notably distinguished themselves in dental science. In 1910 this fund had reached the sum of $10,000, of which the United States contributed only about $2000. The first award from this fund was made to Dr. G. V. Black for his distinguished services.

On December 8, 1915, a handsome bronze statue was

dedicated to Dr. Miller on the campus of the State University at Columbus, Ohio. The funds were raised by the Columbus Dental Society, and contributions were received from almost every state in the Union.

Vines Edmunds Turner was born in Franklin County, N. C., January 21, 1837. He graduated from the Baltimore College of Dental Surgery in March, 1858, entered the Confederate Army as second lieutenant in 1861 and served until the close of the war, being in the meantime promoted to the rank of captain. He was wounded in the battle of Cold Harbor in 1862, went through the campaigns of the Valley of Virginia under General Jackson, and after the war was over located in Raleigh, N. C., where he began the practice of dentistry.

He was a charter member and twice president of the North Carolina Dental Society and served as president of the North Carolina Board of Dental Examiners for more than a generation. He served as president of the National Association of Dental Examiners in 1901, and was treasurer of the National Dental Association from 1904 to 1906, being subsequently elected president of that body at Boston in 1908. In April, 1913, he was appointed by President Woodrow Wilson as Assistant Dental Surgeon, Dental Reserve Corps, U. S. Army.

He was president and director of the Raleigh Street Railway Co., and director for eight years in the North Carolina Railroad Co., and for over twenty-five years of the Raleigh Savings Bank. He died May 11, 1914, at his home in Raleigh, in his seventy-eighth year.

Dr. Turner was a success both in business affairs and in his chosen profession, and it is doubtful if ever any man was more beloved by his confrères.

M. Whilldin Foster was born in Philadelphia May 17, 1837. He began the study of dentistry about 1854, and graduated in due time from the Philadelphia Dental College. About 1861 he became associated with Dr. Robert Arthur, of Baltimore, with whom he remained five years, afterward engaging in practice at 9 West Franklin Street, Baltimore. In 1873, Dr. Foster became connected with the Maryland

Dental College, with which he remained until that college was merged with the Baltimore College of Dental Surgery, when he was elected to the chair of pathology and therapeutics in the latter school. In 1894, upon the death of Dr. R. B. Winder, Dr. Foster was elected dean. He was one of the organizers of the National Association of Dental Faculties, and was twice elected president of the National Dental Association. He represented the National Dental Association at the International Dental Congress in Paris, and at the Fédération Dentaire Internationale at Stockholm. He died at his home, in Baltimore, Md., June 30, 1914, in his seventy-eighth year.

Ferdinand J. S. Gorgas was born in Winchester, Va., July 27, 1834, attended the Dickinson grammar school and Dickinson College, graduating with the degree of A.B. and A.M. He graduated from the Baltimore College of Dental Surgery in 1854, and located first in Madison, Ind., and later in Harrisburg, Pa. In 1863 he graduated from the University of Maryland as M.D. Dr. Gorgas was dean of the Baltimore College of Dental Surgery from 1867 to 1882, and dean of the dental department of the University of Maryland from 1882 to 1911, holding the chairs of operative dentistry, therapeutics and pathology. He was also editor of the *American Journal of Dental Surgery* and edited the later editions of *Harris's Principles and Practice of Dentistry* and *Harris's Dictionary of Dental Surgery*. He was the author of a text-book, *Dental Medicine*, eight editions of which had been published at the time of his death, and a volume entitled *Questions and Answers for Dental Students*. His death occurred April 8, 1914, in Baltimore, Md., in his eightieth year.

George Edwin Hunt was born April 29, 1864, studied in the public schools of Indiana and completed a course in civil engineering in 1882. He entered the Indiana Dental College and graduated therefrom in 1890, and subsequently graduated as M.D. from the Indiana Medical College. He located in Indianapolis and became identified with the faculty of the Indiana Dental College in 1891. He was

secretary of the National Association of Dental Faculties from 1905 to 1913, when he was elected president of that association. He was secretary of his state dental society for seven years, and was president of the Institute of Dental Pedagogics in 1902. He edited the *Desmos*, the mouthpiece of the Delta Sigma Delta Fraternity, was also founder of the *Indiana Dental Journal*, and its editor from 1898 to 1900. In 1911, he became editor-in-chief of *Oral Hygiene*, which position he occupied until his death. It is a matter of record that he was deeply interested in this work, and was largely responsible for the motion-picture demonstrations on oral hygiene held throughout the country. His death occurred July 11, 1914, at Indianapolis, in his fifty-first year. On the evening of November 21, 1914, the dental profession of Indiana held a memorial meeting in the auditorium at Indianapolis in honor of Dr. Hunt.

Greene Vardiman Black, a native of Illinois, born at Winchester, August 3, 1836, was without doubt one of the most influential men connected with modern dentistry. He was raised on a farm, and although he enjoyed poor health and had but a limited education, was an earnest student and an ardent lover of Nature. At the age of seventeen years he began the study of medicine under his brother, Dr. Thomas G. Black, who was then practising at Clayton, Ill., and at the age of twenty-one undertook the study of dentistry in the office of Dr. J. C. Spear, of Mount Sterling, Ill. After one year's training he located at Winchester, Ill., and remained until 1862, when he entered the army and served until 1864, after which he located at Jacksonville, Ill. He remained there until 1897, when his work led him to Chicago, there to spend his remaining years.

To know the rise and progress of dentistry in the past half-century one need go no further than the activities of Dr. Black and his co-workers. They found it not very far advanced above the stage of a skilled trade, the extraction of teeth, making of plates and the working of gold-foil by a few experts, and left it one of the world's greatest sciences, to which pathology, materia medica, bacteriology and surgery

are necessary equipments, and no one man was more potent than Dr. Black in keeping the profession on its upward trend.

Dr. Black is widely known for his scientific books and papers. Always a prolific writer, his works make a valuable library in themselves. He soon became famous, and was a recognized authority on whatever subjects he undertook to master. While his books and papers are numerous, those

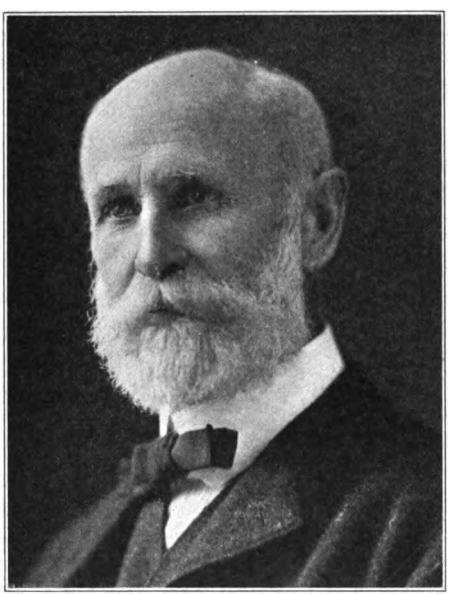

FIG. 28.—Greene Vardiman Black, M.D., D.D.S., SC.D., LL.D. (1836–1915).

especially deserving mention are *Anatomy of the Human Teeth*, *Operative Dentistry* and his numerous works on general and dental pathology.

There appeared in 1886 a series of articles by Dr. Black in the *American System of Dentistry* under the following heads: "General Pathology," "Dental Caries and its Treatment," "Diseases of Peridental Membrane," and "Abrasion and Erosion of the Teeth."

In 1891, Dr. Black published in the *Dental Cosmos* a series

of papers on the "Management of Enamel Margins"; later, in 1895, the same journal for five months contained an epoch-making series of articles from his pen under the general heading, "An Investigation of the Physical Characters of the Human Teeth in Relation to their Diseases and to the Practical Dental Operations, Together with the Physical Characters of Filling Materials." In this series the principle of "extension for prevention" was first made prominent by Dr. Black. That part of his *Operative Dentistry* devoted to scientific cavity preparation is especially deserving of mention, and has given rise to Black Study Clubs throughout the country.

In later years he experimented extensively with amalgam, and gave to the profession, in 1896, the first formula for a scientifically balanced alloy, revolutionizing that branch of dentistry. Those who are familiar with the facts know that in 1895 Dr. Black alone knew the secrets of expansion and contraction and had it in his power to control the manufacture of what are now known as high-grade alloys. Very few men know of the great pressure brought upon him to commercialize his work. His answer was the publication in full of the results of his years of investigation.

Black's *Dental Anatomy* was published in 1890, and four editions of it have been entirely exhausted.

The crowning work of Dr. Black's life consists of his two volumes on operative dentistry, the first edition of which appeared in 1908, and a book entitled *Special Dental Pathology*, published in April, 1915, just prior to his death.

From 1870 to 1880 Dr. Black lectured on pathology in the Missouri Dental College at St. Louis, and from 1883 to 1889 he was professor of pathology in the Chicago College of Dental Surgery. In 1891 he accepted a call to the Northwestern University Dental School as professor of operative dentistry and dental pathology, being made dean in 1897.

One of the greatest aids which Dr. Black has given to the profession of dentistry, and the one probably most far-reaching in its effect, was the introduction of technic work in the schools. He was mainly instrumental in organizing the

National School of Dental Technics in 1893, through which technic work was instituted in most of our schools. He was also chairman of the Committee of Nomenclature of the Columbian Dental Congress in 1893, and laid the foundation for a standardization of terms.

Dr. Black believed in organized effort, and without entering into burdensome details, it may be said that he was a member of almost every medical and dental society of note and held important positions in most of them, serving in the capacity of president of several.

He continued to occupy the post of dean of Northwestern University Dental School until his death, which occurred September 30, 1915. At the meeting of the National Dental Association in 1916 a committee was appointed to arrange for a suitable memorial to be erected to Dr. G. V. Black in commemoration of his signal services, and as the result a handsome memorial monument was unveiled in his honor in Chicago on August 8, 1918, at the twenty-fourth annual meeting of the National Dental Association.

Charles R. E. Koch was born in Birnbaum, Polish Prussia, April 24, 1844. He came to Chicago in infancy, and at an early age began the study of dentistry in the office of Dr. Kennicott, where he remained until August, 1862. At the age of nineteen he enlisted as a private in the Union Army and took an active part in the Civil War, being promoted to the commissioned rank of captain. After the war he joined Dr. Kennicott in the practice of dentistry from 1866 until 1871, then practised alone until 1898. In 1877, he served in the labor riots and rose to the rank of colonel. He served as president of the Chicago Dental Society in 1875 and president of the Illinois Dental Society in 1877. From 1886 to 1891 he was president and secretary of the Illinois State Board of Dental Examiners and in 1891 became president of the National Association of Dental Examiners.

In 1904, Dr. Koch became secretary of the dental department of Northwestern University, and from that time on worked for the uplifting of dental education.

He was the author of a *History of Dentistry*, which gives

special prominence to the advent and development of dentistry in the United States, and is by far the most comprehensive and satisfactory work of the kind so far published. Another book of note by him was entitled *Illinois at Vicksburg*.

His death occurred at the home of his daughter in Newtonville, Mass., July 21, 1916.

John Ross Callahan was born June 28, 1853, in Higginsport, Ohio, and was educated in the Hillsboro, Ohio, public schools. He began the study of dentistry under Dr. John Ellis and later entered the Philadelphia Dental College, from which he graduated in 1877. He practised in San Francisco for two years, removed to Hillsboro, his native town, where he remained eleven years, and then located in Cincinnati for the remainder of his life.

Dr. Callahan was active in dental society affairs, holding important positions in several.

Being of a scientific turn of mind, he was deeply interested in research work, and during his life gave the profession a scientific method of root-canal work, especially useful for treating putrescent conditions of the teeth, using for this purpose sulphuric acid, and lining the canals, before filling them, with chloro-resin (a solution of resin in chloroform), which method is now generally known by his name.

In the light of present knowledge in regard to oral sepsis, few men have made more important contributions to dentistry. His death occurred at his home in Cincinnati, February 12, 1918.

Henry William Morgan, son of Dr. William Henry Morgan, was born in Davidson County, Tenn., October 25, 1853, and received his early education in Nashville, graduating from the high school in 1873. He immediately entered the medical school of Vanderbilt University, and after graduating as M.D., entered the Philadelphia Dental College, from which he obtained the degree of D.D.S. in 1877, after which he became associated with his father in the practice of dentistry. In 1886, he was made professor of operative dentistry in the newly created School of Dentistry of Vanderbilt University,

and in 1911 became dean. He served in this capacity until the school was temporarily discontinued, due to the unsettled conditions brought about by the World War, and when the school was reorganized, he was made dean emeritus. He was active in dental society work, being at some time president of the American Institute of Dental Teachers, Nashville Dental Society, Tennessee State Dental Association and the National Association of Dental Faculties. He was actively interested and held high offices in many other organizations, both fraternal and dental, as well as being a devout member of the M. E. Church South. It may be truthfully said that Dr. Morgan did as much to establish dental education on a high moral and ethical plane as any other one man in the South. He died January 17, 1920, at his home in Nashville, Tenn., after several weeks' illness.

B. Holly Smith was born at Piscataway, Prince George's County, Md., March 17, 1858. His early education was received at Loudoun Valley Academy, Va., and in the Baltimore schools. In 1881, he graduated from the Baltimore College of Dental Surgery, and in 1883 from the College of Physicians and Surgeons of Baltimore, after which he entered the practice of his profession in that city, and soon attained a high standing. He was a fluent orator and a much sought for after-dinner speaker. During his professional career he was president of the Southern Dental Association, National Dental Association, Maryland State Dental Association, National Association of Dental Faculties and the Oral Hygiene Council of Maryland, and was a member of many other organizations. He was mainly instrumental in uniting the American Dental Association and Southern Dental Association into our larger and more effective National Dental Association in 1897.

Soon after his graduation, in 1881 he became an assistant demonstrator in the Baltimore College of Dental Surgery, and upon the death of Dr. Winder, in 1894, succeeded him to the chair of operative dentistry. On June 8, 1914, he became president of the college, which position he held until his death, January 22, 1920.

Among the names of those deserving eulogy greater than can be given here are the following: J. Leon Williams, a New Englander, justly famed as an artist and histologist; Eugene Solomon Talbot, born at Sheron, Mass., 1847, but for many years a resident of Chicago, an investigator and writer of many papers, as well as the originator of valuable formulas. There was also Morrison, who invented or rather adapted the dental engine, and Atkinson, who evolved the dental mallet, both of whom should not be forgotten. To mention these is not to exclude the vast host of others whose uplifting influence has been the inspiration of the dental profession.

CHAPTER X.

THE HISTORY OF ANESTHESIA (LONG, WELLS, MORTON, JACKSON).

Anesthesia, a term denoting total absence of all sensibility, was coined for William T. G. Morton by Oliver Wendell Holmes in 1846.

Some of the bitterest controversies connected with the history of medicine and surgery have raged in regard to the various claimants for the honor of its discovery. While its discovery in its present sense is truly modern and American, in its broader definition it goes back to ancient times and to a number of drugs.

If the Holy Bible is to be believed, the first surgical operation under anesthesia was performed in the Garden of Eden when "God caused a deep sleep to fall upon Adam, and he slept: and he took one of his ribs, and closed up the flesh instead thereof."

Guy de Chauliac used sponges soaked in the juice of opium, hyoscyamus, lettuce, etc., to produce slumber, under which operations were performed. Hypnotism has also been used for the same purpose by Mesmer and others since 1776, and many narcotic drugs and intoxicants have been known and used for centuries. Vinegar mixed with gall (or myrrh) was given Christ on the cross for the purpose of lessening his pain, as was the custom in executing malefactors. From the time of Noah the effects of alcohol, of which the anesthetics are all near relatives, have been known. Hemlock was imbibed by Socrates during his last hours to relieve his pain. Thus the world has always sought relief from the horror of the surgeon's knife and childbirth, but with only a few crude and unreliable remedies, until Velpeau wrote, in 1839, "To escape pain in surgical operations is a chimera which we are not permitted to look for in our time."

Sulphuric ether has been known since the thirteenth century and was used variously both internally and by inhalation for the relief of pain due to catarrh and colic, and later, by way of diversion, because of its exhilarating effects.

Chloroform was discovered in 1831, simultaneously in the United States, France and Germany, although it was not used as an anesthetic until sixteen years later.

Crawford Long.—So far as modern anesthesia is concerned, Dr. Crawford Long, of Danielsville, Ga., who graduated from the medical department of the University of Pennsylvania in 1839, seems to have been the first to perform any operation under anesthesia, having, according to Roswell Park, anesthetized a patient and removed a tumor without pain in 1842. This was suggested to him by the effect of ether when inhaled for amusement during the so-called "ether frolics" in which Long and his friends engaged. Long lived in an isolated place and no report of this case was made until 1849, after Morton's results were published, and the incident caused only town talk at the time. Long died in 1878, before the unfortunate controversy in which he had become involved was concluded. Nevertheless, there is good reason to believe that he is entitled to the credit of having first used sulphuric ether as an anesthetic, though he did not give his discovery to the world at the time.

Horace Wells, the first to use nitrous oxide as an anesthetic in surgery, was born at Hartford, Vt., January 21, 1815. He spent his boyhood days on the farm of his father, a physician, at Westminster, Vt., on the Connecticut River, where he enjoyed every comfort that his parents could provide. After completing his education in private schools, he began studying dentistry at Boston, in 1834, under private tutors, and later opened an office there, removing some time afterward to Hartford, Conn.

As early as 1840, he expressed a wish that there might be some way of alleviating suffering due to painful extractions. He had as student assistants in his office John M. Riggs and William T. G. Morton, of Boston, the latter of whom was one of the claimants for the discovery of the principle

of anesthesia. Dr. Wells's discovery took place in the following manner: He and his wife attended a lecture on chemistry and natural philosophy, given by Prof. G. Q. Colton in Hartford, December 10, 1844, at which Prof. Colton was demonstrating the effect of laughing gas on willing subjects for the amusement of the audience. Dr. Wells inhaled the gas and also noted its effects on the others. Another spectator, Mr. Samuel A. Cooley, was severely bruised and injured by his frantic pranks while under the effects of the gas without knowing it or feeling the least pain. From that incident, Dr. Wells was so convinced that painless operations could be performed under its effects that he made arrangements that night with Mr. Colton to come to his office the next day and administer the gas to him while Dr. Riggs, his former pupil, extracted a troublesome wisdom tooth for him. Being so delighted with the result, he at once exclaimed, "A new era in tooth-pulling! it is the greatest discovery ever made!" and other similar remarks. Thus, surgical anesthesia by means of nitrous oxide was discovered December 11, 1844, and Horace Wells, a dentist, was the discoverer. Although Sir Humphry Davy had, according to Dr. C. A. Harris, suggested laughing gas for painless operations in 1776, no one had successfully used it before Dr. Wells.

Dr. Wells immediately went to Prof. Colton for directions as to making the gas, and after securing the necessary apparatus, used it regularly for some time thereafter in his practice, he and Dr. Riggs practically devoting their entire time to the painless extraction of teeth for several weeks. A few weeks later he went to Boston to introduce his discovery, but after giving one demonstration on a boy, who made an outcry while having a tooth extracted, although he subsequently stated that he did not feel any pain, was hissed by the students as a "humbug," denounced as a failure, and the learned doctors of Boston would have nothing further to do with him. He met with much discouragement and finally returned to Hartford and resumed his practice. In the fall of 1846, Dr. William T. G. Morton and Dr. Jackson

announced the discovery of their "compound letheon," which was afterward proven by Dr. J. Foster Brewster Flagg, and acknowledged by Morton to be nothing more than washed sulphuric ether, disguised with aromatics, and therefore not controllable by patents, and though its effects were known to Dr. Wells and others two years before, they had tried it and considered it unsafe. Harris in his *Principles and Practice of Dentistry* (tenth edition, 1871, p. 410) says: "The practicability of producing anesthesia with ether was demonstrated by Dr. Horace Wells, of Hartford, Conn., in 1846, and soon afterward brought prominently before the medical and dental professions by Dr. W. G. S. Morton, of Boston, Mass., both practical dentists" (evidently referring to Dr. W. T. G. Morton).

Drs. Morton and Jackson denounced the "laughing gas" as a failure and continued to push their "compound letheon," which was patented, so that Dr. Wells was practically forgotten, and after many discouragements, failing in health and mind, due, it is believed, to experimenting on himself too much with anesthetics, became despondent and ended his own life January 24, 1848. Dr. Wells's death and the discovery of the anesthetic properties of chloroform by Dr. (later Sir) J. Y. Simpson, of Scotland, in 1847, caused nitrous oxide to be foregotten until it was again revived by Dr. Colton and Dr. J. H. Smith, in 1862, but these gentlemen gave Dr. Wells all the credit for its discovery as an anesthetic. The state of Connecticut and the city and citizens of Hartford have erected a beautiful monument in Bushnell Park inscribed to "Horace Wells who discovered anesthesia, December 11, 1844." There is also in the capitol at Hartford a tablet erected by the Connecticut State Dental Association to the memory of Dr. Wells.

To commemorate the fiftieth anniversary of the discovery of anesthesia, the American Dental Association, in 1894, placed a bronze bust of Dr. Wells in the Army Medical Museum at Washington, D. C.

On March 27, 1910, there was unveiled on the United States Square, Paris, France, a statue of Horace Wells, by

the famous sculptor, Bertrand Boutée, erected by our foreign confrères and presented to the city of Paris in honor of Dr. Wells's great discovery.

William T. G. Morton was born in 1819, studied dentistry in Baltimore in 1840, and was associated with Dr. Wells from 1841 to 1843. In 1844, he entered the office of Dr. C. T. Jackson as a medical student, but never graduated. When Dr. Wells went to Boston to introduce laughing gas, Morton consulted with him in regard to its use and effects. Later, Morton consulted his preceptor, Jackson, who suggested sulphuric ether instead of the gas, stating that it had the same effect, and on September 30, 1846, Morton administered ether successfully for an extraction. On the following day he engaged an attorney to secure a patent, and soon afterward he and Jackson took out one jointly.

Dr. Morton secured permission to test his invention in the Massachusetts General Hospital, October 16, 1846, and successfully placed a patient under the influence of his "letheon" for an operation. He also gave several subsequent demonstrations, all of which were successful. He disguised the ether with aromatics, and it was not until the hospital authorities refused to use a secret preparation that he made known that the drug was ether. It appears that Morton would hardly pass muster as an ethical practitioner at present on account of his process patents, selling office rights and the secrecy of his formula, although it is known that such practice was not uncommon among dentists in those days. He appears to have been of a mercenary nature and made repeated efforts to secure a Congressional pension, but finally, after much disappointment and spending his fortune in bitter controversies with Jackson and others, lost his health and died in 1868.

Charles T. Jackson graduated from Harvard Medical College in 1829, and later became a geologist, mineralogist and chemist. In 1846 he became much interested in anesthesia with Morton, and when Morton's demonstrations proved successful, he immediately set up the claim of having suggested it. The death of Dr. Wells left the fight to Morton,

Jackson and Long. Jackson succeeded in getting some recognition in Europe, but not much at home. Jackson's mind became deranged in 1873, and he died in 1880.

In a memorial sent to Congress the Massachusetts Medical Society expressed its opinion that "William T. G. Morton first proved to the world that ether would produce insensibility to the pain of surgical operations."

Sir James Paget has said that "While Long waited and Wells turned back and Jackson was thinking, Morton the practical man went to work and worked resolutely . . . and compelled mankind to hear him."

Regardless of whatever faults Morton had, he appears to have given the world the advantages of anesthesia, and the matter seems to be forever settled by his election to the Hall of Fame during the past year.

James Y. Simpson, of Scotland, introduced chloroform, in 1847, as a substitute for ether, which was less agreeable. It was first demonstrated by him at the Royal Infirmary, November 15 of that year. Simpson died in 1870, and upon his bust in Westminster Abbey is this inscription: "To whose genius and benevolence the world owes the blessings derived from the use of chloroform for the relief of suffering."

CHAPTER XI.

HISTORY OF OPERATIVE DENTISTRY.

DENTISTRY was formerly divided into three branches, **operative, mechanical** and **oral surgery.** Mechanical dentistry had to do with the replacement of lost parts, the construction of regulating appliances and the manipulation of the work-room and laboratory. Oral surgery formerly included operations upon the jaws and antrum, and all work of a surgical nature except extractions. Operative dentistry included all classes of fillings, extractions, crowning of teeth, cleaning, etc. During the early history of this country, dentistry was practised by many itinerants, barbers and quacks, more as a trade than as a learned profession; however, from ancient times we have always had a few men who were highly skilled in this art. Egyptian mummies are said to exist which show evidences of gold fillings, but if they exist their whereabouts are at present unknown.

It is impossible to state definitely when, where or by whom the operation of filling teeth was first practised, since authentic records are lacking. Celsus, about 50 A.D., recommends stuffing badly decayed teeth with lint or lead before extraction. Joannes Arculanus (Giovanni d'Arcoli) about 1450, described a method of filling teeth with gold and this method, he says, is the same as that used by the Arabians several hundred years previous to his time.

Fauchard, in 1728, recommended scraping the cavity for removal of caries and then stopping it, preferably with fine tin or lead and lastly gold, which, he says, is not so satisfactory. He most probably cut his tin and gold into strips and worked it as ribbon (non-cohesive) gold is now used.

It was the beginning of the nineteenth century before the operation of filling teeth was practised by any except a few of the most skilful dentists.

James Snell, of London, has given us considerable information in regard to the early practice of dentistry in a work published in Philadelphia in 1832. He prefers forceps for extracting teeth, but it is interesting to note that he regards the key as a modern instrument and the forceps as an ancient one, it having been used by Celsus. Although he did not use the key himself, he advised those with little experience to resort to it instead of forceps, as these require greater skill. He used mouth mirrors made of polished

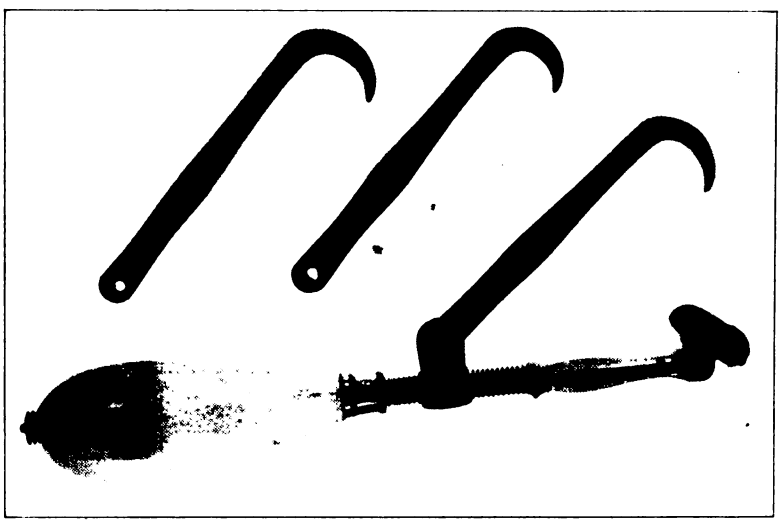

FIG. 29.—Modified pelican or early form of English key. (Army Medical Museum, Washington, D. C.)

steel instead of glass, and used a file wherever it was possible to remove caries by its use. His method of filling or stuffing teeth is very interesting, but unsatisfactory when measured by present-day standards. He gives a very accurate account of the beautifully ornamented pearl-handled and gold-ferruled instruments in current use about the middle of the nineteenth century, although they are said to have been in use at an earlier date by Lister and Plantou. These instruments were more ornamental and far less efficient than those in use at present. They were sometimes beautifully inlaid and orna-

mented with jewels and fitted into plush-lined cases, costing from $500 to $1500 or more for a set. The author secured a case of these old instruments a few years ago which formerly belonged to an old dentist of Washington, D. C. Several cuts of them are shown herewith. It will be observed that

FIG. 30.—Two gum lancets, pearl-handled mouth mirror and two ivory-handled, gold-ferruled burnishers. (Author's collection.)

hand pressure was the only method then generally used for manipulating gold (Figs. 30, 31, 32 and 33).

Harris says that gold was used as a filling material in the early part of the eighteenth century, but it was certainly not used at that time to any great extent. Dr. Parmly states

that the first gold filling he ever saw was in 1815, and was put in by Dr. Waite, of London. He also states that he was

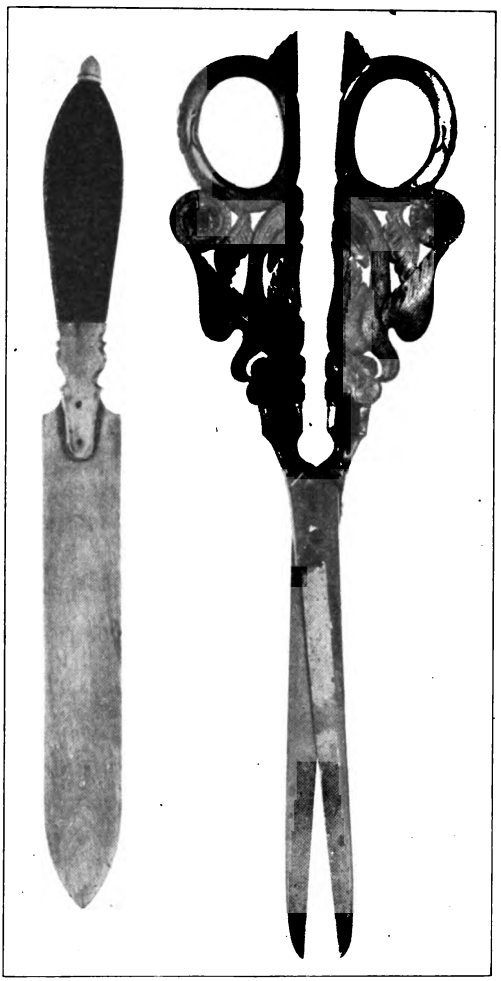

FIG. 31.—Scissors and spatula for manipulating gold-foil. The handles of the scissors are beautifully carved of pearl and inlaid with gems. (Author's collection.)

surprised when, about 1815–1818, he made a trip down the Mississippi Valley to find considerable excellent dental work,

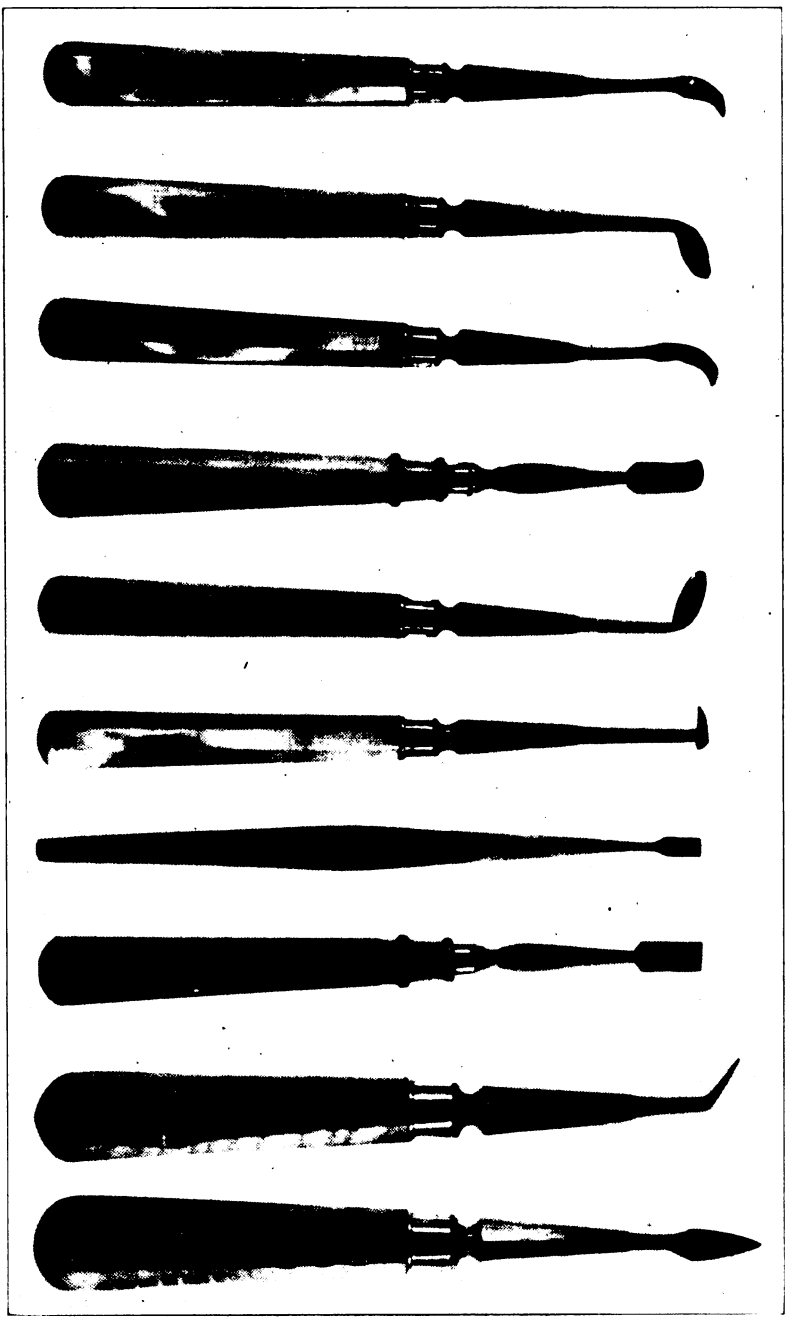

FIG. 32.—Pearl- and bone-handled, gold-ferruled scrapers and chisels. (Author's collection.)

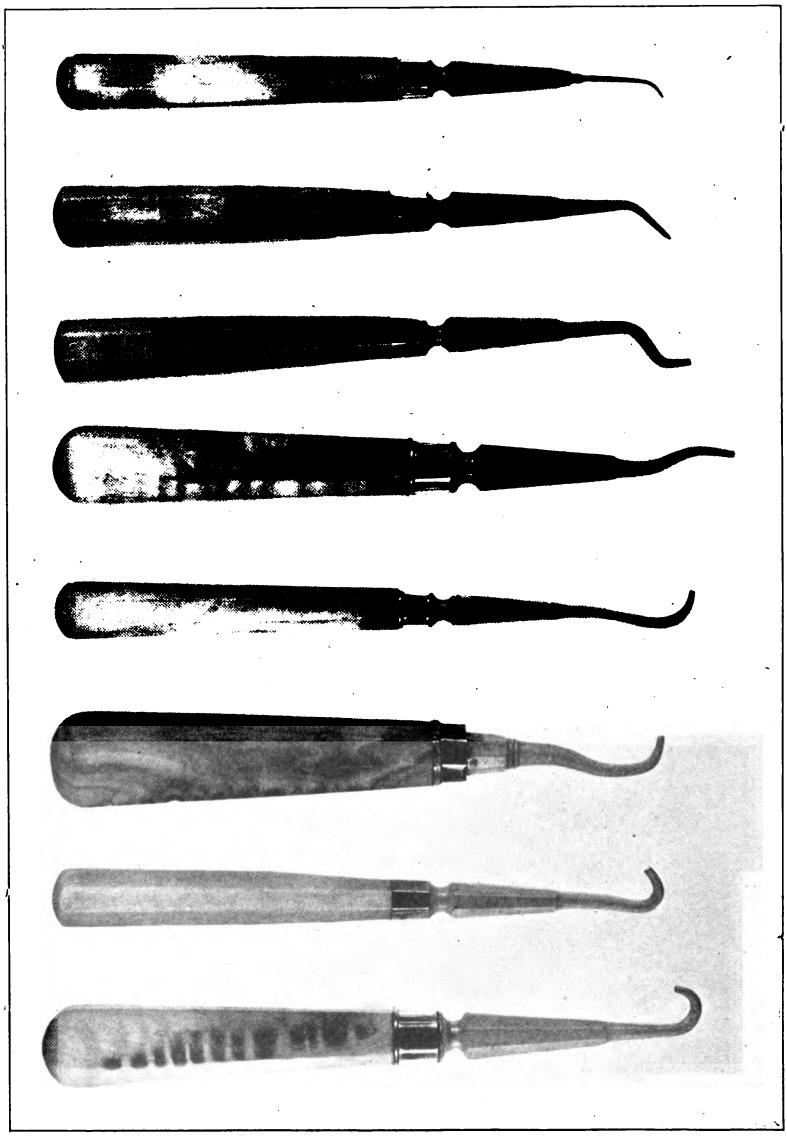

FIG. 33.—Ivory- and pearl-handled, gold-ferruled instruments for inserting gold fillings. Nos. 1 and 2 are awl-shaped for inserting gold and piercing center of pellet; the remainder are for condensing at different angles. (Author's collection.)

emanating, no doubt, from the French settlements about New Orleans.

The form in which gold was first used was the leaf furnished by gold-beaters, but this being too thin, was soon replaced by rolled gold, which was made preferably from the Brazilian Johannes, which was the purest gold coin obtainable. In 1812, Marcus Bull was in the gold-beating business in Hartford, Conn., and was the first most likely to prepare gold especially for dental use. Mr. Abbey, a later partner, was his apprentice, and being interested in chemistry, soon took charge of refining the gold they used. Dentists brought to them their Johannes, "old joes," to have them rolled with their rollers, as they were always in order. Young Abbey (he was only about fourteen, perhaps younger) asked why they chose that coin? Then he consulted with Mr. Bull and suggested that they try pure gold. Mr. Bull liked the suggestion and had a sample prepared, and it proved so superior that they entered into its preparation as a business. The demand was so great and increasing, that in 1817 they moved to Philadelphia, then the commercial center of the United States, and very soon Bull's dental gold had a world-wide market. At first gold was inserted in the form of pellets, being pierced in the center, and more gold added until the filling was firm. There was also a variety of other methods for inserting it.

In October, 1846, Dr. C. T. Jackson, of Boston, had a tooth filled with *sponge gold*, made by a process which he had discovered. Dwinelle was really the first to call attention to the possibilities of working gold adhesively (cohesively). Dwinelle also introduced contour filling.[1]

A form of gold was introduced from England, about 1849, in small pellets composed of sand-like particles, but it was difficult to use. Then followed Watt's first "sponge" gold that made quite a furore in 1853, and next a form of crystal gold made by an electrolytic process. This suggested to

[1] See American Journal of Dental Science, April, 1854, new series, 4, 346, for Dwinelle's paper showing what he did with it.

Dr. Robert Arthur, of Baltimore, that the same might be done with foil. Louis Jack, who was his assistant, tried the experiment that Arthur suggested and found that annealed foil could be welded. In the spring of 1855, Dr. Arthur announced the use of cohesive gold-foil for filling purposes. It has recently been claimed that Dr. Westcott, of Syracuse, discovered the cohesive properties of gold and lectured on the same at the Baltimore College of Dental Surgery in 1847, but no publicity apparently was given the subject at that time. Many other men claimed to have known of this property long before Dr. Arthur's announcement, but as none of them had made known the discovery, he is justly entitled to the credit for having given it to the dental profession. This statement is from Dr. Jack, but he disclaimed any credit, giving that unreservedly to Arthur. By making use of this form of gold it became possible to build contour fillings, and gold prepared in this manner immediately came to be in great demand. Cohesive gold was long known to all makers of foil for dental use; it was their bug-a-boo, and frequently caused them serious loss. Many of these matters have been lost sight of, although they have revolutionized the methods of inserting gold fillings.

While both platinum and silver-foil have been used as filling materials, neither has ever become very popular, but at the same time tin has occupied an important place as a filling material. It came into general use about 1830 and has been used to a considerable extent since that time. Amalgam has of late, however, caused the almost entire displacement of this and all other cheap filling materials.

The first plastic fillings to be used were solutions of gums in ether or alcohol. Then came "terro-metallic cement," composed of calcium sulphate with oxide of iron. About 1820, fusible metal composed of bismuth, lead and tin was introduced in this country.

Amalgam.—According to Dr. William H. Trueman, of Philadelphia, the use of amalgam for filling teeth came about in this way: "Mr. W. H. Pepys, of London, first introduced fusible metal in 1805. This method was particularly

successful, but the heat required was quite objectionable, and to overcome this, Regnart, a French chemist, advised the addition of one-tenth its weight of mercury in 1818, and in that way amalgam came into general use. In 1837, J. L. Murphy, of London, published a work in which he described the preparation of an amalgam made of silver and mercury, stating that he had used the same with satisfaction for twelve years. In 1843, Taveau, of Paris, wrote of a silver paste, an amalgam of silver and mercury, which he had used for seven or eight years, stating that it was the same preparation used by English dentists. Then about 1833 the Crawcour brothers came to New York and began filling teeth with amalgam under the shining title of "royal mineral succedaneum." They seem to have been as ignorant and incompetent as the worst advertising quacks of the present day. For a time they flourished and made money rapidly, while the best dentists sat idly in their offices. Thus the seeds of bitterness were sown that developed into a fight which threatened the disruption of the profession itself. Despite this, many dentists adopted amalgam as a filling material, so that when the first dental college, journal and society were formed it was considerably used by itinerants, but was regarded with disfavor by the better practitioners. The attempt to read out of the American Society of Dental Surgeons all who used it finally caused the disruption of that society because of the ever-increasing numbers who had adopted it. The oldest form of amalgam was made by filing Spanish or Mexican coins and mixing with mercury, until about 1855, when Dr. Townsend gave the profession the formula of four parts of silver and five parts of tin.

The first investigations looking toward improvements in amalgam were made by John Tomes, of England, in 1861. Then Charles Tomes, in 1871, determined changes in bulk by specific gravity. Valuable researches were also made from the clinical standpoint by J. Foster Flagg and Thomas B. Hitchcock, but nothing decisive was done until 1895, when Dr. G. V. Black set to work to solve the problem and laid the foundation for a scientifically balanced alloy. As the

result of his work, amalgam has become far more valuable than ever and is saving more teeth than any other filling material, though considerable skill is required to secure satisfactory and lasting results. It still remains in the hands of the charlatan and quack just what it was in the hands of the Crawcours.

The New Departure Creed was announced in 1871 by Drs. J. Foster Flagg, S. B. Palmer and Henry S. Chase, and was based on the electro-chemical theory of decay, which was for several years a subject of controversy. It resulted in a large increase in the use of plastics for filling materials and a diminution of the use of gold. Many able men never subscribed to the "new departure," and when Miller announced the true cause of caries the controversy gradually subsided. The chief dispute was in regard to the damaging effects of gold in contact with tooth structure.

Copper Amalgam is said to have made its appearance about 1840. It was reintroduced in 1887 and has had a limited use ever since. Its value lies in its antiseptic properties.

Zinc Oxychloride was advocated as early as 1860 as a filling material, and about 1879 the oxyphosphate cements were perfected to overcome the trouble with the soluble qualities of the oxychlorides. Further improvements have been made with these cements until they are now made to fill every need.

Silicate Cements as a filling material have been introduced at various times under a number of trade names and are more or less variable in lasting qualities as well as appearance. They have been much improved and have come into general use in the past ten years. They are somewhat more durable than the oxyphosphates, and if care attends their use and they are not subject to great stress, very beautiful restorations may be made with them.

Gutta-percha as a temporary stopping came into use about 1847, and Hill's stopping, a mixture of gutta-percha with certain hardening agents added, was patented in 1849. This was followed by several brands, including Bevin's and Premium. It was very soon used as a capping for exposed

pulps, and is still in favor for that purpose. In 1887, the excellence of gutta-percha as a root filling caused the introduction of root-canal points. Temporary stopping, a low-heat gutta-percha, was first introduced in 1888, and remains today the most popular dressing seal.

Inlays.—As to who first used inlays there is much speculation. J. L. Murphy's book, in 1837, is the first that we can locate to describe them. The subject has been given considerable notice in our dental journals since 1858. It is also said that inlays were known and used by the ancients, probably as an ornamentation, especially by the aborigines of Central and South America. Dr. William H. Trueman does not attach much importance to the stories of inlays in aboriginal skulls. The porcelain inlay, however, has been used in some form for a long time. Originally, pieces of artificial teeth were ground to fit a prepared cavity and held in place with some form of cement, and later, so-called glass inlays were baked in matrices of platinum and then cemented in place. This gradually led to the use of a porcelain body such as is used in artificial teeth, and for many years dentists have made pleasing restorations of this sort. Dr. Charles H. Land, of Detroit, did much to perfect latter-day porcelain inlays, and was noted for his beautiful ceramic work. He originated the matrix method of making inlays and patented his process in 1887. About the same year a method of making gold inlays was evolved by Dr. Charles S. Alexander, of Charlotte, N. C., by burnishing a matrix into the cavity and filling it with gold. From this method was evolved the hood crown and saddle. Dr. Hinman, of Atlanta, and Dr. Trigger, of Toronto, both read papers in 1895 on the making of inlays of this character as bridge abutments.

Gold Inlays were not used to any great extent until a process was introduced by Dr. Taggart in a paper read before the New York Odontological Society, January 15, 1907. He used the disappearing mold method, or casting from a wax impression imbedded in an investment material composed of plaster of Paris modified by the addition of marble

dust, sand, graphite or other substances to withstand heat and to control expansion and shrinkage. His method has revolutionized the operative branch of dentistry. Although he is entitled to the credit of having perfected it, this method does not appear to have been original, as is shown by the following: In 1846, Charles Holtsapffel published an account of a method of casting small statues by the use of the disappearing mold, which is very much like the method introduced by Dr. Taggart for making gold inlays.[1] At the World's Centennial Exhibition a German exhibited a collection of small insects, perfectly cast of iron. The insect was invested, burned out and the molten iron poured in. A few years ago a party of Filipinos exhibited their products in Philadelphia, among which were bronze tobacco pipes, which had been made by them for many years by the disappearing wax model method. A search of the United States Patent Office records shows that several casting machines were patented in the 80's and 90's, and essentially every principle of Dr. Taggart's machine was covered long before he obtained his patent, December 13, 1907. During the years 1908 and 1909, following Dr. Taggart's announcement of a new method of making inlays, the dental magazines were filled with articles on that subject. Most of the writers hailed this new method as a panacea, and many new devices were placed on the market for carrying out the casting process.

In 1909, much interest was aroused as to the claims of Dr. Taggart against the profession for violations of his patent, and a crisis was precipitated when he sued Dr. Boynton, of Washington, D. C., for damages for using his process with a casting machine of another make. It was generally conceded that the profession owed much to Dr. Taggart for this valuable invention, and such a controversy was extremely unfortunate. On February 25, 1913, Associate Justice Charles H. Robb, in the Court of Appeals of the District of Columbia, handed down a decision nullifying this patent and reversing the decision of the lower courts.

[1] The article is published in the Dental Register, 1908, 62, 211.

In May, 1918, Judge F. A. Geiger, of Illinois, rendered a decision against Dr. Taggart in the case of Taggart *versus* Bremner, which had been in the courts for some time, and brought the Taggart gold inlay controversy to an end. Up to this time Dr. Taggart had sued hundreds of dentists in various parts of the country for infringement of his patent.

Forgetting all of the unpleasant features, it must be conceded that Dr. Taggart has given to the profession and to humanity one of the greatest boons it has received in recent years. The gold inlay, in skilful hands, is probably the most satisfactory and permanent filling yet produced, but in the hands of the slovenly is equally unreliable.

Dental Pulp.—The treatment of the dental pulp had not received very much attention until the time of Robert Wooffendale about 1783. Various forms of treatment were used by J. Foster Flagg and Leonard Koecker about 1825, oil of cloves, oil of cajuput, camphor, opium, alum and myrrh being among the remedies used for the relief of toothache. In the year 1836, Dr. Shearjashub Spooner, in his book *Guide to Sound Teeth*, introduced arsenic for devitalizing teeth. Although in 1839 a warning against this dangerous drug was given by Dr. Chapin A. Harris in his work, *The Dental Art*, the warning went unheeded. Capping exposed pulps was practised by D. C. Ambler as early as 1827 and by Leonard Koecker in 1826, both using a tiny plate of lead to lay over the exposure.

Root Filling seems to have been considerably practised since about 1845, and many prominent dentists used gold, amalgam and sometimes even hickory-wood points for this purpose. The practice of knocking out pulps by driving a sharp stick in the canal to remove its contents and afterward using the point as a root filling was in common use for some time. It appears that the practice of using mummifying paste was introduced by Dr. W. D. Miller about 1893, and the agent he used for this purpose was bichloride of mercury; but later, alum, thymol and formalin came into favor for the same purpose.

About 1890, Dr. Schreier, of Vienna, introduced sodium

and potassium for the cleansing of root canals preparatory to filling, and in 1894, Dr. Callahan introduced sulphuric acid for the same purpose.

The first evidence of improvement in root-canal work over the old empirical methods seems to have developed about 1901, when Dr. Weston A. Price delivered an illustrated lecture before the Cleveland Dental Society, demonstrating the practical use of the *x*-ray in root-canal work, showing 85 radiograms, of which 35 showed alveolar abscesses on filled teeth and 30 disclosed other examples of imperfect root fillings. In 1905, Dr. Sinclair Tousey, of New York, advocated and employed the *x*-ray in dental diagnosis, using both the films and fluoroscope as well as mounting stereoscopic pictures.

In 1911, Dr. Rhein called attention to the need of the *x*-ray, and further advocated the use of Schreier's paste and the use of electrolytic medication for infections of the periapical region.

Silver Reduction Method.—For several years past Dr. Percy R. Howe has been using and advocating the silver reduction method of treating root canals, and his method seems to offer certain advantages.

Drs. Callahan, Rhein, Best, Crane and others have contributed much of value to this important branch of dental surgery for the prevention and removal of focal infection.

Filing for the Removal of Caries is one of the oldest operations practised for the preservation of the teeth. This plan succeeded where the caries was superficial and finally led many to advocate the entire removal of all contact points, which operation was in late years called "Arthurizing," because something of the sort was advocated by Dr. Robert Arthur in a work on operative dentistry published in 1871. It is not believed that Dr. Arthur contemplated any such destruction as was credited to him, but merely the removal of buccal and lingual surfaces of the contact point, so as to render these surfaces self-cleansing. This practice was condemned by action of the American Dental Convention two years later.

Cavity Preparation.—The first scientific work along this line seems to have been done by Dr. G. V. Black. In 1891, he contributed five articles to the *Dental Cosmos* on "The Management of Enamel Margins." In these papers, Dr. Black goes into the physical properties of enamel, the lines of cleavage, direction of rods, as also the phenomenon of

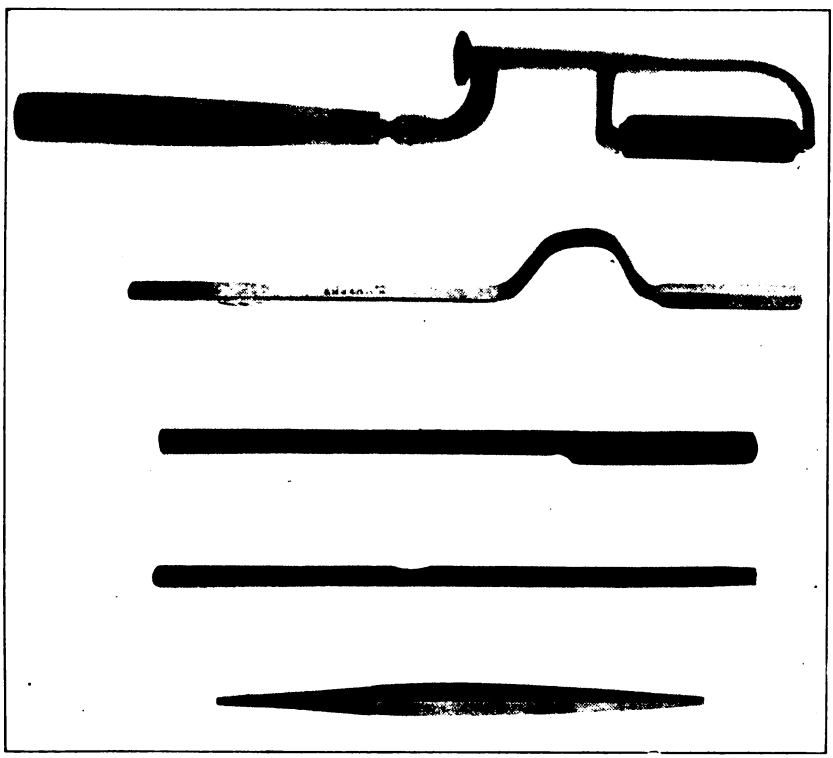

FIG. 34.—Several types of files used for separating teeth or removing caries. (Author's collection.)

caries, and advocates the doctrine of "extension for prevention." This phrase, coupled with Dr. Black's reputation as a scientist, caught the profession, and so sound were the principles laid down then and since by Dr. Black that his is the only system of cavity preparation now generally recognized.

Pyorrhea, though sometimes treated as in the domain of the specialist, comes naturally under the head of operative dentistry or oral surgery, depending upon the form of treatment used. Abulcasis was apparently the first to recognize this disease and make use of scalers (scrapers, of which he used fourteen forms). Dr. John M. Riggs seems somehow to have rediscovered this disease, or at least to have fully described it and given a method of treatment in 1840. Dr. Joseph Head advocated ammonium bifluoride for use in pyorrhea pockets. In the *Dental Cosmos* for July, 1911, there appeared an article upon the use of autogenous vaccine in the treatment of pyorrhea alveolaris, by G. D. Laymon, D.D.S., Indianapolis, Ind. The recommendation was based upon the theory that pyorrhea is caused principally by bacteria of the staphylococcus family. This was followed by another in 1912 by Drs. Perkins and Jones, of Nashville, Tenn. Much doubt was thrown on this theory by Dr. John Deans Patterson and other later writers.

On July 1, 1914, Dr. M. T. Barrett read a paper before the Pennsylvania State Dental Society by Prof. Allen J. Smith on buccal protozoa (*Endameba buccalis*) as the cause of pyorrhea. On July 30 of the same year another paper on the same subject appeared by Angelo Chiavaro, of Rome, Italy, and was read before the Paris meeting of the American Dental Society of Europe (*Dental Cosmos*, 1914). About the same time similar findings were also published by Drs. Bass and Johns. Owing to its efficacy in the treatment of amebic dysentery, emetin was now extolled for the management of pyorrhea, but this treatment has not met with the success that was at first expected and the curing of pyorrhea, along with root-canal work is still one of the nightmares of dentistry

The Rubber Dam.—Various mechanical devices were used for drying cavities prior to the invention of the rubber dam. Cotton, bibulous paper, rubber tubing, wax coffer dams and dams of plaster of Paris were some of the means used. Not until 1864 did Dr. S. C. Barnum give this wonderful invention to the profession. His invention was at once accepted,

and in 1870 he was voted a gold medal and $1000 by the American Dental Association. The Massachusetts Dental Society voted him a gold watch and chain and a sum of money in recognition of his services.

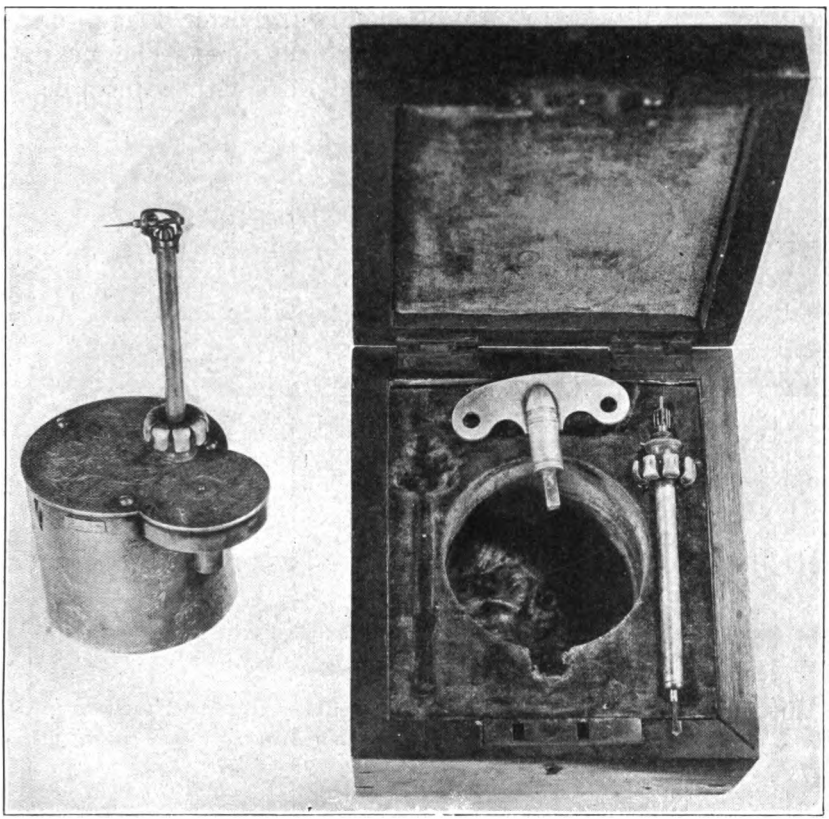

FIG. 35.—Dental engine, patented in England by George Fellows Harrington, October 20, 1864. It is operated by a spring clockwork, and is believed to be the oldest motor-driven dental engine. (Army Medical Museum, Misc. Ser. 2489.)

Cutting and Drilling Instruments were very crude and were not much improved until 1846, when the first forward step was taken by Dr. A. Westcott, who introduced the finger ring with drill socket attached. An illustration of the style of ring and long-handled burs or drills in use is shown herewith.

For those who worked at the chair regularly, Nature provided a callous pad which is said to have answered nearly as well (Fig. 40).

The first machine to receive the attention of American dentists for preparing cavities in teeth was the simple bow-drill of the jewelers, introduced by J. Foster Flagg, of Boston, and extensively used for some time. The next invention along this line was a hand drill with adjustable

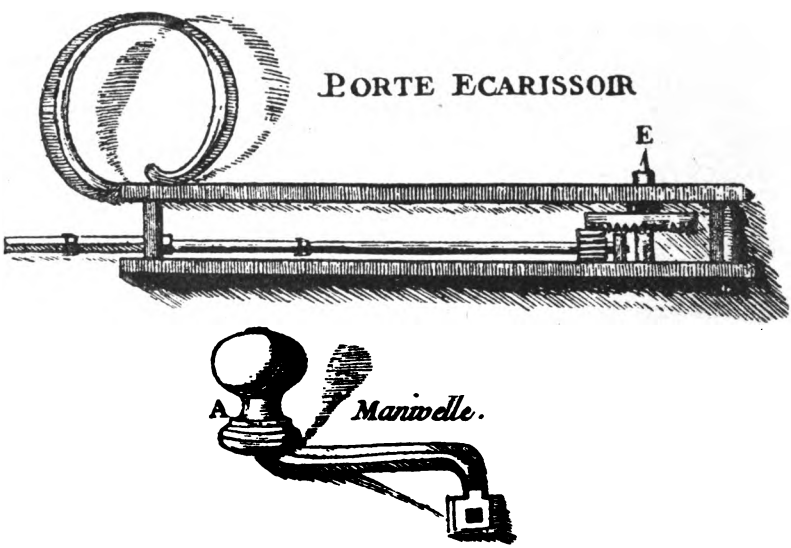

FIG. 36.—Machine for drilling cavities in teeth described by Fauchard in *Le Chirurgien Dentiste* in 1728 and Jourdain's *Elemens d'Odontologie* in 1756, see page 58.

head, invented by John Lewis, and patented November 29, 1838 (Fig. 37). Other similar drills were patented in 1847 and 1848. Quite a number of hand drills were in use about 1850, two of which are shown herewith (Fig. 39). One is an old English ratchet drill now in the Army Medical Museum, Washington, D. C., and the other, a somewhat more elaborate affair, is now in the author's possession. Very little progress was made from that time until 1858, when Charles Merry invented the first drill having a flexible cable similar to that

used on horse-clipping and sheep-shearing machines. He also invented the first angle piece in 1862.

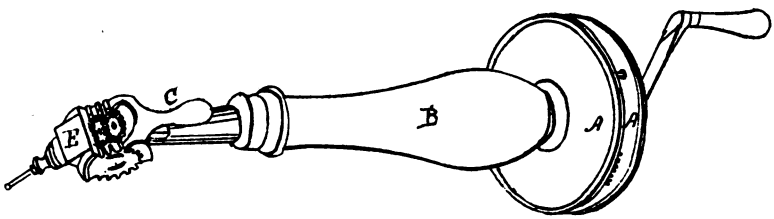

FIG. 37.—Drawing of hand drill with adjustable head patented by John Lewis, November 29, 1838.

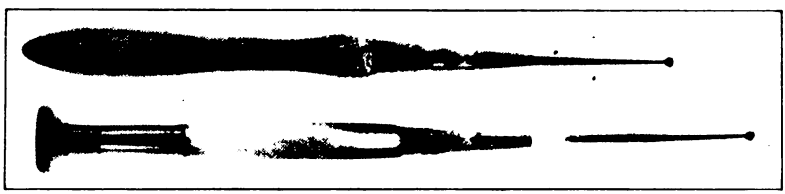

FIG. 38.—Two handles for holding drill bits or burs, one with revolving head. (Author's collection.)

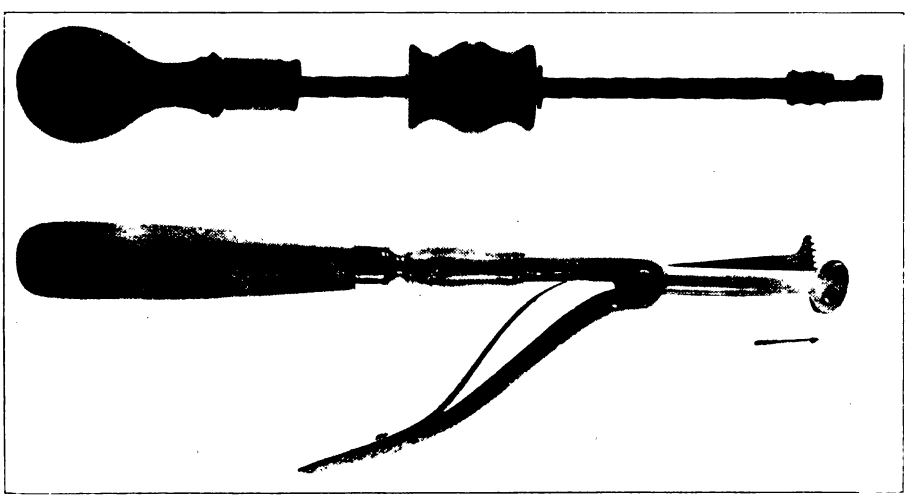

FIG. 39.—Upper, old ratchet drill used by English dentists to prepare cavities. (Army Medical Museum, Washington, D. C.) Lower, hand drill for operating drill bit at right angle. (Author's collection.)

The first motor-driven dental engine was patented in England by George Fellows Harrington in 1864 (Fig. 35).

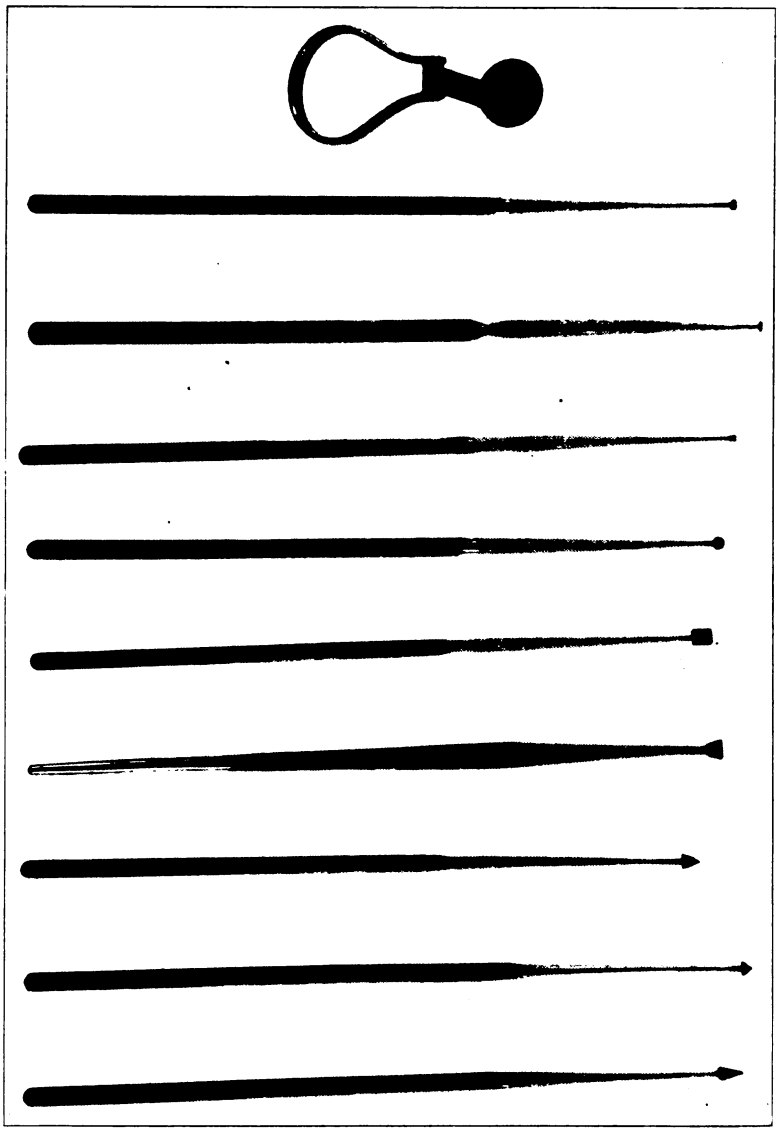

FIG. 40.—Finger thimble and hand burs, used prior to the invention of the dental drill or engine. (Author's collection.)

It was operated by spring clockwork and was provided with a key for winding up the spring. The next decisive step was the invention of the Morrison engine in 1870 and the S. S. White in 1876. Both were very much of the same type as the foot engines in current use. About the same time, Elliot's suspension engine appeared. These three forms were largely improved and adapted to present-day needs by the S. S. White Company and other prominent manufacturers of dental supplies. The application of electric motors for operating dental engines was another great step in its evolution. This followed in natural order the development of electricity in other lines of industry.

For Filling Instruments, formerly any wedge-shaped tool that would reach the cavity was considered to be sufficient, as only non-cohesive gold was used; but with the advent of sponge or crystal gold, pluggers were designed to give greater force, and latterly, when Dr. Arthur introduced cohesive gold, the toothed or serrated pluggers were recommended for its manipulation. The use of the mallet for condensing was introduced, though not invented, by Dr. W. H. Atkinson in 1861 and officially accepted by the American Dental Association in 1866. Dr. William H. Trueman says that the mallet was used for condensing gold by Dr. Jacob Gilliam, of Philadelphia, about 1812, and Dr. Atkinson relates that Dr. Merrit, of Pittsburgh, used it in 1838. The automatic mallets which have been in general use are the Snow and Lewis, the Abbott and the Foote. Following these the Bonwill electro-magnetic mallet appeared in 1875 and the Bonwill engine mallet was introduced in 1879.

Matrices were used as far back as 1871 by Dr. Louis Jack, and many forms were soon thereafter devised; the form of thin steel with holes near the end, to be held in place with a clamp, soon displacing all others.

Fountain Cuspidors.—The Whitcomb fountain spittoon was first put out by S. S. White in 1866, and other forms were brought out in 1871, and from these the present types were evolved.

The Operating Chair was a gradual evolution from the ordinary easy chair with additions of such conveniences as a head rest, adjustments for varying height, etc. Several dental chairs appeared about the middle of the nineteenth century. The first chair to provide such conveniences as head-rest and changes in height and position of the rest and back was that of M. W. Hanchett in 1848. The next year another was devised by F. Searle, of Springfield, Mass. These and the one patented by A. Merritt Asay, in 1850, seem to be the first exclusively dental chairs invented and the forerunners of the chairs of the present day. In 1850, Mr. J. D. Chevalier, of New York, made a head-rest for attachment to an ordinary chair. The hydraulic chair was patented in 1851, and T. C. Ball patented the lifting jack in 1855. The Perkins chair was patented in 1855 and placed on the market. Later, the Whitcomb and Salomon chairs appeared, and a very elaborate chair with a spittoon was marketed by Snowden & Cowman in 1870, and the Harris chair in 1872. The old S. S. White chair was brought out in 1876, but it was too near the introduction of the hydraulic chair for it to have a long life. Another chair of merit was the Wilkerson, invented by Dr. B. M. Wilkerson, of Baltimore, and for a long time the most satisfactory dental chair in existence. The more modern chairs need no introduction to present-day practitioners.

THE DENTAL HYGIENIST.

Dental Hygiene as an organized movement seems to have had its origin in this country at least, in New York City, where the Dental Hygiene Council was organized January 12, 1909, with Dr. H. L. Wheeler as chairman. Early in 1910, provision was made for holding exhibits and arousing interest in the movement. The matter was taken up soon afterward by the National Dental Association, and the work was successfully introduced in Rochester, Boston, Marion (Ohio), Philadelphia, Cleveland, Baltimore, Washington and other cities. The oral hygiene movement is not

a new one but dates back to many of the ancient writers, including Abulcasis.

The Dental Nurse was prominently mentioned in an editorial in the June, 1912, number of the *Dental Cosmos*, and agitation was begun to give her a legal status. Much opposition was at first voiced against this action from those who were either jealous of her ability or believed that her privileges would be abused.

The state of Connecticut seems to have taken the lead in this move, and the Connecticut Dental Hygienists' Association was formed in April, 1915, with a total membership of forty-six. By June, 1916, the membership had increased to ninety-five. The dental law regulating the education and licensing of dental hygienists in Connecticut went into effect July 1, 1917. Several other states have also legally recognized this new profession, and legislation is pending in others.

Forsyth Infirmary, of Boston, and Eastman Dispensary, of Rochester, have both instituted special courses of instruction to properly qualify young ladies for the position of dental assistant, hygienist or nurse, and several dental colleges have instituted similar courses.

It is too soon to predict the influence of this new variety of dental specialist upon the practice of dentistry and the health of the public, though the present tendency is largely in her favor.

CHAPTER XII.

PROSTHETIC DENTISTRY, CROWN AND BRIDGE-WORK, ORTHODONTIA, ORAL SURGERY.

PROSTHETIC DENTISTRY.

PROSTHESIS in some of its branches has been practised from the most remote times and all nations and peoples have probably taken part in its development—Egyptians, Grecians, Etruscans and Romans all contributing their part. Mummies, sarcophagi and urns reveal many instances of dentures of ivory, wood and gold, but much valuable information in regard to dentistry, especially in its prosthetic branch, was undoubtedly destroyed by the almost universal practice of cremating dead human bodies in ancient times. Egypt was the most highly civilized of ancient nations, and in her tombs and catacombs relics of prosthesis have been found which show that dentists were possessed of a fair degree of skill in ancient times. Belzoni gives an account of a set of teeth carved from ivory and fastened to a gold plate. He says, "I also discovered bone and wooden teeth." Among the frescoes found at Thebes and Memphis is one portraying a dentist operating on a patient.

A number of specimens of prosthetic appliances were also found in Phoenicia, Rome and Greece. The Etruscans perfected crown and bridge-work to a high degree, and there are specimens of their work in the museum at Corneto (Italy), derived from a tomb more than twenty-four hundred years old. A few years ago a tomb was said to have been opened near Rome containing a skeleton of a woman with a complete set of false teeth on gold bases, showing a high degree of prosthetic skill.

During the time of Celsus and Galen the Romans practised prosthesis. In Arabia, about 1100 A.D., Abulcasis was

an expert "carver of human teeth," and made dentures of bone and ivory. Ambroïse Paré constructed dentures with gold and silver bases in 1517 and Hemard made ivory dentures in 1622. In 1600, the *Manchester Times* tells about the parson who could not preach on the Lord's day because he had sent his artificial teeth up to London to be repaired, and they had not been returned. In 1728, Fauchard is reputed to have suggested the idea of making teeth of porcelain, though he probably did not carry it out himself. He also used springs to hold dentures in place (Koch's *History of Dentistry*, 1, 248–249).

Porcelain Teeth were first invented by Duchateau, a chemist, with the aid of M. Guerhard, a porcelain manufacturer. To Nicholas Dubois de Chemant, however, belongs the credit of perfecting the invention and making it public in 1788. These teeth were baked in a single block, which answered for both teeth and gums, until 1808, when Fonzi introduced individual teeth with platinum pins (or staples) baked in. Porcelain teeth were not introduced into America until Dr. A. A. Plantou arrived in Philadelphia from Paris in 1817, bringing a supply of porcelain teeth with him. Not much improvement was made in these "split-bean" forms until Samual W. Stockton began the manufacture of teeth in America about 1825. The greatest improvements were made by S. S. White soon after he began to manufacture them in 1844. Thus America though the last country to adopt porcelain teeth was the first to materially improve them.

John Tomes, writing of artificial teeth in 1840, denounced porcelain teeth, saying they were only fit for quacks. As late as 1875, Claudius Ash & Sons, of London, kept ivory blocks in stock, from which false teeth were carved by the dentists of that time.

In 1766, Robert Wooffendale constructed a set of teeth for William Walton, of New York, and by most authorities this is credited with being the first full set of teeth made in this country. James Gardette, who came to America from France in 1778, was probably the first dentist in America to use clasps to retain dentures. John Greenwood is said to

have been the first dentist to make plates of gold in this country, and while practising in New York also carved a full upper and lower set from hippopotamus tusks for George Washington. He also used spiral springs for the first time in America, though they had previously been used by Dubois de Chemant in France. Prior to this, flat springs were in general use.

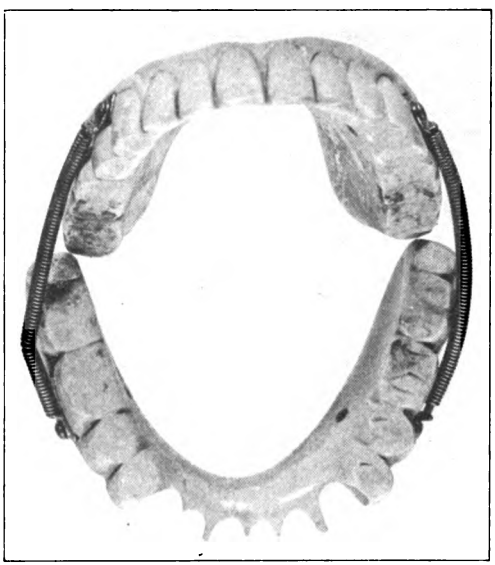

FIG. 41.—Set of upper and lower teeth made of ivory and held in place with brass springs. (Contributed to the Army Medical Museum, Washington, D. C., by Dr. N. M. Caina, Galle Face, Colombo, Ceylon.) (Path. Ser. 12283.)

Following Dubois de Chemant's discovery, the first efforts at manufacturing *continuous gum dentures*, originated in France with M. Delabarre and others in 1820. This method consisted in baking porcelain on a platinum base, giving a continuous porcelain surface without break between palate, teeth and gums, hence the name "continuous gum." These experiments ended in failure because of the imperfect materials and meager knowledge of working porcelain.

To Dr. John Allen, of Cincinnati, Ohio, belongs the honor of having succeeded where these men failed by successfully manufacturing continuous gum plates in 1844. Dr. Allen patented the process, and Dr. L. P. Haskell, in an article in the *Dental Cosmos*, 1910, relates having bought the right to make these plates in 1851 from Dr. Allen for $150. This, the most beautiful of all prosthetic restorations, has not been materially improved since Dr. Allen completed his experiments in 1851. However, the furnaces of those days were crude and depended on coal, coke, gas and oil for fuel, the electric furnace being the invention of Dr. L. E. Custer in 1894.

Dentures made entirely of porcelain were introduced in 1854 by Dr. Mahlon Loomis, who patented the process in the United States, England and France. In 1867, Dr. William E. Dunn, of Cleveland, Ohio, took out another patent on a method that differed slightly from that of Loomis. This method of making plates was practically a repetition of the method used by Douchateau and de Chemant, and has never attained great importance.

Cheoplastic Metal was introduced by Dr. A. A. Blandy, of London, in 1856, for the purpose of making dentures, and for a time was very popular, but was soon displaced by vulcanite. The method consisted in casting the plate of a low fusing alloy and attaching the teeth at the same time.

Celluloid was first introduced to us when Smith Hyatt patented a process for manufacturing this article in 1869. It becomes plastic enough to mold at from 250° to 300° F., and was extensively used for some time in plate work as a substitute for vulcanite, but its lack of durability caused it to be discarded.

Vulcanite Plates.—Rubber, a combination of caoutchouc and sulphur, was discovered by Charles Goodyear about 1840. In 1851, Nelson Goodyear invented a process for making vulcanite or hard rubber, and in 1855, Charles Goodyear patented a process for making dental plates of this material. Then the Goodyear Company bore down upon the dentists, like the "vulture on the lamb," and grabbed their hard-

earned shekels and carried them away to their vaults. Still in 1858 about 300 and in 1863 about 3000 dentists employed vulcanite in making dentures, and after the patents expired it came into general use. On June 7, 1864, and January 10 and March 1, 1865, patents were granted to John A. Cummings for an "improvement in artificial gums and plates." The Goodyear Company became the owners of the "Cummings patents," and again began to issue licenses to dentists to use the process in their practice. These licenses were issued for one year only and were countersigned by Josiah Bacon, treasurer for the company, who on account of his arbitrary methods was shot and killed by a member of the dental profession in San Francisco. Finally, S. S. White took up the cause for the profession and spent much time and money, and after a struggle lasting seven years, won two suits against the company. This with the tragic death of Bacon put an end to the abuse.

The Dental Articulator was first invented by J. B. Gariot about 1805. In 1848, Daniel T. Evans, of Philadelphia, patented the first anatomical articulator, but the first satisfactory appliance of this kind was the invention of Dr. Bonwill in 1858. Since that time many types have appeared, among which those by Dr. Snow and Dr. Gysi have been most popular.

In the January, 1910, issue of the *Dental Cosmos* there is an article by Dr. Alfred Gysi, of Zürich, Switzerland, setting forth the problems met with in dental articulation, and going minutely into the movements of the mandible and methods for their measurements. Dr. Gysi also introduced in this and succeeding articles his method of articulating dentures, including the use of the now well-known "Gysi" articulator. These articles were a translation of Dr. Gysi's book, first published in Berlin in 1908.

In this country Drs. Hall, House, Patterson and others have perfected a new technic for making more scientific dentures, which promises much in the way of improvement over older methods. It is too early yet to predict what the final result of their work will be.

Cast Aluminum Plates were first advocated in 1870, and since that time have been extensively used. The metal has many desirable qualities, but doubtless the lack of a satisfactory solder and its uncertain durability in contact with the oral secretions have prevented its more general use.

Obturators.—The first definite description of a palatal obturator was by Ambroïse Paré in 1541. Fauchard brought palatine prosthesis to a high degree of perfection, and described five different obturators, which were, however, defective on account of being somewhat too complicated. Dr. Norman W. Kingsley manufactured velums in 1860, and in 1879 published an extensive work on the history of obturators and other methods of treating congenital and acquired cleft palate. To him we are indebted for much of our present knowledge of the subject. Nearly all of these appliances are now made of hard rubber instead of gold plates and sponges, as was the case before vulcanized rubber was discovered. The history of obturators dates back nearly four hundred years and that of artificial velums more than eighty. The manufacture of obturators and artificial velums combined has met with most encouraging results.

CROWN AND BRIDGE-WORK.

There are many specimens of ancient bridge-work on which wires, ligatures and clasps were used to hold one or more substitutes for natural teeth in place. All of the old works on dental prosthesis from Paré down show illustrations of various forms of crown and bridge-work.

Bridges were made and described by Dr. J. B. Gariot in 1805, Dr. C. F. Delabarre in 1820, Dr. S. S. Fitch in 1829, J. Patterson Clark in 1836, and in 1855, Dr. W. H. Dwinelle described something on the order of the bridges in present use. Modern bridge-work, however, dates from 1850. Up until the present time many types of bridges have been made and used; probably those using the "tin-can" crown as an abutment have been the most plentiful and abominable of all. This form of abutment was patented by Dr. J. B. Beers

in 1873. To Drs. Goslee, Chayes, Peeso and Nesbitt we are probably indebted for the most notable improvements in this class of work. Many types of individual crowns have been invented, among which, in addition to the gold crown, the Logan (patented in 1885), Richmond (patented in 1880-1883), Alexander hood and the Land porcelain jacket crowns have been the most important. Crown and bridge-work gave rise to several forms of replaceable teeth facings, among which the Steele is now the most important.

The Collar Crown, which differs but slightly from the Richmond, was invented by Wilbur F. Litch in 1883, and following this, bridge-work came into general use. About 1886, Dr. Alexander evolved the telescoping crown as an anchorage for removal dentures, and in 1896 he perfected an attachment of the cast cusp or hood type which could be used as a bridge abutment. In 1905, Dr. W. E. Dieffenderfer, of Washington, D. C., described a method of making open-faced gold crowns. J. A. Pennington, of Pittsburgh, Pa., in 1906, introduced the use of inlays as abutments for bridge-work.

The All-porcelain Jacket Crown is the invention of Dr. Charles H. Land, of Detroit, who patented it in 1889 and introduced it about 1890, giving it his name, the "Land jacket crown." It was greatly improved by Dr. E. B. Spaulding, of Detroit, and later was extensively used and given publicity by Dr. W. A. Capon, of Philadelphia. In the *Dental Cosmos*, November, 1909, Dr. R. H. Riethmueller described a method of making an all-porcelain jacket crown, using $\frac{1}{1000}$ platinum as a matrix on which to bake the porcelain, for which he claimed many advantages, such as natural appearance and less stress on roots.

Root Implantation.—At the Washington meeting of the National Dental Association in 1912, Dr. E. J. Greenfield, of Wichita, Kan., gave a clinic on artificial-root implantation to be used as abutments for crown and bridge-work, using for this purpose a platinum cage or basket set in an artificial socket in the bone, exhibiting a man wearing a full upper denture supported in this way. On January 28, 1913, he

read a paper before the Academy of Stomatology of Philadelphia, fully describing this method of treatment. This novel method of retention for dentures seems not to have been used to any great extent, though introduced by Jourdan and Maggiolo as early as 1807.

Hunter's Indictment.—Like lightning out of a clear sky, and at a time when dentistry was viewing with self-satisfied complacency the results of its skilled handicraft, Dr. William Hunter, of London, October 3, 1910, delivered his famous address, "The Role of Sepsis and of Antisepsis in Medicine," before the opening session of the Faculty of Medicine of McGill University, Montreal, Can., which address was printed in the London *Lancet* in January, 1911. In this address he arraigned the whole system of crown and bridge-work as then practised in an indictment which again marked an epoch in dental progress. So great has been the influence of this article on the thought and action of the dental profession that the editor of the *Dental Cosmos*, contrary to the custom of that magazine, republished the article in the July, 1918, issue. This scathing arraignment of what is usually termed in England "American dentistry," which is there looked upon as "dental parlors" are in America, has been more than justified by carefully conducted scientific investigation, with the result that much of the crown and bridge-work formerly considered good dentistry has been thrown into the discard. It is doubtful if such dentistry as Hunter saw was really representative of the higher type of the American product, but rather that of the charlatan and quack.

Following this awakening, crown and bridge-work of the fixed type has had a set-back and is now more or less under the ban, while various removable types are coming into favor. That introduced by Dr. Norman B. Nesbitt, of Boston, in 1915, with various modifications, has been accorded a prominent place.

ORTHODONTIA.

Although Celsus, in 50 A.D., advised that a misplaced erupting tooth be "pushed toward its place by means of the

finger," and other writers frequently referred to irregularities of the teeth, it appears that the first scientific attempts at correcting irregularities were made by Pierre Fauchard. His first book, *Le Chirurgien Dentiste*, published in 1728, describes his method of correcting irregularities by the use of silk ligatures and gold or silver bars. He also made use of the file for reducing the dimensions of the teeth, and in some cases used the forceps or pelican for forcibly placing the teeth in position, after which they were held by ligatures. His bars, though crude in form, were the forerunners of all appliances in use at present.

Fauchard's Bars were improved by Bourdet by carrying the strips back to the molars on either side and punching holes to receive ligatures around each tooth in the series. This method was followed by Berdmore in 1770. In 1778, Hunter, in his *Natural History of the Human Teeth*, carried out the ideas of Fauchard and others of that day. The first notable improvement was by Joseph Fox in 1803, when he advocated the use of the gag block on either side in addition to the bars, that the jaws might be kept apart while the bite was being "jumped." He also advocated the use of the skull cap for retruding protruded teeth. It remained for Catalan, in 1814, to introduce the inclined plane for moving inlocked incisors outward. Delabarre, in 1819, first described a method of rotating a tooth by means of a metal box or band and a wire spring attached to one of the posterior teeth. He also introduced the first wire crib to be attached to the teeth, which appliance later found great favor. In 1823, Desirabode introduced ferrules which he attached to the ends of the bars and passed over the teeth that were used for anchorage. Instead of the ferrules he sometimes used the cap or gold crown. For ligatures he used raw silk or platinum wires. In 1828, Maury used guard hooks to prevent the ligatures sliding below the gums and causing damage to them.

M. M. A. Schange, of Paris, devised a crib about 1841 which was an improvement on that used by Delabarre because of its lighter weight. He disapproved of filing or

extracting to provide space for moving teeth, and advised enlarging the arch instead.

Fox, Harris, Tucker, Angell, Flagg, McQuillen and others treated extensively of this subject in their time. Dwinelle, of New York, was the inventor of the jackscrew in 1849, which found great favor for a time. Dr. Thomas W. Evans, of Paris, paid a visit to America in 1853 and contributed some notable improvements to the methods then in use by simplifying and improving them.

Following the discovery of vulcanite in 1853 it was soon adopted as a base for artificial teeth, and this was followed by its use for regulating purposes. It was first used by Joseph Richardson about 1860 in the construction of various forms of frames, cribs and plates.

Norman W. Kingsley was the next to make any great advance in this line when he began to publish a series of articles in 1871 on correcting irregularities of the teeth, the culmination of which was his book on *Oral Deformities* in 1880. This was the first comprehensive work on the subject, embracing as it did much that was original as well as a summary of that which had been published before. By most writers he is regarded as the "Father of Orthodontia," since he is the first to reduce it to anything like a science.

Some improvements were made from time to time, such as the Coffin expansion plate, introduced in 1881, which was an improvement on the crib used by Delabarre in 1819. This was modified in 1887 by Dr. V. H. Jackson into what is now generally known as the "Jackson crib," this being the first removable appliance in general use.

J. N. Farrar in a series of papers published in 1876 sought to show that force used in moving the teeth should be intermittent rather than continuous, and advocated the screw in some of its many forms for this purpose. He stated that movements of the teeth are accompanied by physiological changes in the tissues when a limit of $\frac{1}{240}$ to $\frac{1}{160}$ inch movement in twelve hours is not exceeded.

He published a work on *Irregularities of the Teeth and Their Correction* in 1888 and a second volume in 1898.

Edward H. Angle.—The next great step was in 1887, when a paper was read in Washington, D. C., before the Ninth International Medical Congress, by Dr. Edward H. Angle entitled *Notes on Orthodontia.* This was the beginning of an elaborate system known as the "Angle system of orthodontia," the mechanical principle of which is a wire arch attached to anchor bands on the molars and designed both for the expansion of the arch and the moving of individual teeth. His first set of appliances was perfected and marketed in 1889, and his first book, *Treatment of Malocclusion,* appeared in 1900. He was the first to give us a scientific classification of irregularities to form a basis for rational treatment. Up to his time most of the efforts along this line had been directed toward "regulating" or "straightening" the teeth, little attention being given to the normal occlusion so long as the teeth were of even appearance. "Orthodontia" consists of putting the teeth where they belong to function properly, that is, in normal occlusion, and that is what Dr. Angle's system has provided for.

Dr. Angle was a strong advocate of the idea that separate educational training for orthodontists was absolutely necessary, and in 1900 he succeeded in founding the Angle School of Orthodontia, the first postgraduate school of the kind. Not content with this he succeeded in organizing the American Society of Orthodontists in 1901, and was instrumental in establishing *The American Orthodontist,* the first journal devoted to this subject, in 1907. Not satisfied with past achievements he has used his pen freely as well as his brains and has kept us fully informed of the progress in his chosen specialty.

On September 13, 1911, a paper was read before the Angle School of Orthodontia by Dr. Angle, giving the history of the expansion arch from the days of Fauchard up to date, with valuable additions and modifications thereto. Dr. Angle laid special emphasis on a new pin and tube appliance which he had recently brought out, now generally known by his name, by virtue of which the teeth are moved bodily, both crown and root, in any desired direction instead of tipping

the crowns as heretofore, this being another new departure in orthodontia. These appliances are made of precious metal and all forms of ligatures are dispensed with. This paper was followed by another on September 5, 1912, before the Alumni Society of the Angle School of Orthodontia, entitled "Further Steps in the Progress of Orthodontia." In this paper he dwelt at length upon the study of bone growth and the delicacy of his new appliances. This paper brought out improvements in technic rather than in fundamental principles as described in his previous paper. Caution is given by him against the use of great force, just enough being used to stimulate bone growth.

In the March, 1916, *Journal of the National Dental Association* there is an article on the "Evolution of Bodily Movement of Teeth," by Carl B. Case, of Milwaukee, describing some further developments in orthodontia. It would be impossible to give due credit to all those who have had a hand in developing this important specialty, but just one more name remains to be mentioned.

On March 29, 1919, Dr. C. A. Hawley, of Washington, D. C., read a paper before a gathering of orthodontists at Baltimore on a new appliance known as a removable retainer, being an improvement over the fixed type of retainer heretofore used in orthodontia, by means of which the wearer could remove, clean and replace the retainer without the aid of a dentist or orthodontist, this being a most important step from the standpoint of oral hygiene.

ORAL SURGERY.

Oral Surgery is a well-defined and separate specialty. Whether it belongs to general surgery or to dentistry, or whether the dental student needs more oral surgery and more knowledge of general medicine and surgery, or whether the medical student and practitioner needs more dentistry by way of the oral surgical route, is a question. Garretson's *Oral Surgery*, which was the first systematic work on this

subject, included everything in dentistry and much on general medicine and surgery.

The operation of extracting teeth is probably the oldest of dental operations, though treated as a relatively unimportant matter by many writers. Though classed by some writers under the head of operative dentistry, its importance places it more properly in the hands of the oral surgeon. Koecker was one of the first to advocate better instruments and to condemn the use of the key, pelican and punch. Harris, in 1839, alluded to improvements in dental forceps which had brought them into general use. The history of dental forceps and their use is as old as dentistry or surgery itself, and no attempt will be made to trace their evolution here, except to say, that the first complete modern set seems to be the work of Dr. Josiah Foster Flagg in 1828.

Horace Wells discovered anesthesia by means of nitrous oxide in 1844, but it did not come into general use until 1863. In 1873 this gas appeared in liquid form. Ether was used by Morton and Jackson for extractions in 1846. *Cocain* was first successfully used for extractions in 1886, and was in general use for many years. In 1906, Uhlfelder and Einhorn discovered *novocain* and placed it on the market, and while many imitations have been introduced, in combination with adrenalin it still holds first place as a local anesthetic. In the same year (1906), Dr. Noguie, of Paris, introduced a method of nerve-blocking known as "conductive anesthesia" for extractions.

On October 22, 1912, Dr. R. H. Riethmueller read a paper at Philadelphia entitled "Local Anesthesia in Dentistry with Special Consideration of Novocain," describing in detail the technic and instrumentarium necessary, giving special attention to the modifying influence of suprarenin when combined with novocain in isotonic solutions.

On April 16, 1912, Dr. Charles K. Teter read a paper at Bridgeport, Conn., on the use of *nitrous oxide and oxygen* as a general anesthetic and its use in dentistry, by which prolonged anesthesia as well as analgesia could be maintained, and shortly thereafter suitable apparatus for combining these gases was placed on the market. Dr. Teter claimed to have

used nitrous oxide and oxygen since June, 1899, much of his work being done in hospitals for general and oral surgery, during which time he had administered these gases 21,000 times.

The discovery and use of suitable anesthetics have done much to advance oral as well as general surgery. Prior to the introduction of cocain practically all dental operations in oral surgery were done without anesthetics.

The Transplantation of Teeth was undertaken in America soon after the American Revolution by Gardette, Lemaire, Flagg and others, and for a time this procedure had great vogue. This operation has been introduced at various times before and since, but with only temporary success. Replanting, introduced about the same time, has had somewhat better success, but though advocated by many even to the present time, has never come into general use. Replanting was originally done when teeth were aching to sever the nerve and relieve pain, as well as to replace those extracted by mistake or accidentally knocked out.

The first recognition of oral surgery as a specialty of dentistry was about 1864, when Dr. James E. Garretson was made professor of anatomy and surgery at the Philadelphia Dental College, now Temple University Dental School. In 1869, he was appointed oral surgeon to the hospital of the University of Pennsylvania. At first this branch was thought to apply only to those with a general medical and surgical education who were drawn to this specialty, but later dentists embraced the title. Among the early operations along this line were those for cleft palate and hare-lip.

The Roentgen Ray.—Since the advent of the roentgen ray, discovered in 1895 by William Konrad Roentgen, light has been thrown on many previously unrecognized conditions. With the knowledge imparted by it we are able to diagnose and treat successfully abscessed teeth, necrotic bone, excementosis, pulp nodules, impacted teeth, infections of the antrum, osseous tumors, jaw ankylosis, etc. These conditions are brought before the surgeon's vision and he is enabled to apply appropriate remedies intelligently. This apparatus is indispensable to the oral surgeon and to the dentist. In war time it was extensively used in the search for foreign

substances in the face, and it enabled the surgeon to decide what course to pursue in their removal.

In June, 1905, Dr. M. I. Schamberg advocated the surgical treatment of chronic alveolar abscess by *amputating roots* of the teeth so affected with a bur. This operation with a much improved technic is still practised by many dentists who are skilled in oral surgery. The opening of the antrum, first practised by Cowper and Drake, is regarded as strictly within the field of oral surgery.

The greatest strides in oral and maxillo-facial surgery came about as the direct result of the large number of wounds of the face and jaws received in trench-fighting in the late World War. Soon after the war broke out the American Ambulance Hospital was established in France and Drs. Hayes and Davenport had charge of the dental section, and the foundation was laid for the splendid work done later.

In the *Dental Cosmos* for March, 1916, there is a very interesting article on war dental surgery by Dr. George B. Hayes, of the dental section of the American Ambulance at Paris, France, showing the remarkable restorations that were being made at that time. At the meeting of the National Dental Association in New York, October, 1917, Dr. George Loewy, of New York, presented an able paper on the now famous "Carrel-Dakin Treatment of Wounds," which had much to do with cleaning up infections of the face and jaws in later work. Briefly, this method consists of the constant irrigation of the wounds with a solution of sodium hypochlorite, which liberates nascent chlorin, by means of which disease-producing microörganisms are quickly destroyed or rendered inert.

The war work of the dental profession fell broadly into two categories, one that may be called pure dentistry and the other oral surgery, or the treatment, in conjunction with the general surgeon, of injuries of the jaws and face. The oral surgeon has thus come to be a reality and not a myth, as is vouchsafed by the excellent work done in the treatment of injuries not alone in France and Belgium, but in some of our best army hospitals of the United States, notably the Walter Reed Hospital, Washington, D. C.

CHAPTER XIII.

DENTAL COLLEGES AND EDUCATION.

THE first organized attempt to teach dentistry as a profession was about the year 1797, when **Joseph Fox** delivered a series of lectures to the medical class at **Guy's Hospital**, London. Fox also wrote a book on dentistry, which was published in 1803, under the title *The Natural History of the Human Teeth.* These lectures were given to supplement those on medicine and surgery, and constituted an additional or optional course for those students of medicine who wished to fit themselves especially for the practice of dentistry. Dental training was thus acquired by those who had already become or were becoming proficient in general medicine. This antedates the first dental college by thirty-six years. Some work was done by LeMaire, Gardette, Flagg, Hayden and others, who tutored private classes, but it was not until the establishment of the first independent dental college that dental education really made any great advancement as a learned profession.

BALTIMORE COLLEGE OF DENTAL SURGERY.

The first college ever established for training men as dentists was the Baltimore College of Dental Surgery. It was organized in 1839, a charter was granted February 1, 1840, and the first session began in the following fall, with Horace H. Hayden as president and Chapin A. Harris as dean. Dr. Hayden, after locating in Baltimore in 1804, instructed classes in his office at night for some years, and finally, in 1825, he was invited to give a course of lectures before the medical classes of the University of Maryland. An attempt was made by several prominent men, including Drs. Hayden,

Harris and Solyman Brown, to have a dental department established in connection with the University of Maryland, but they were informed by the medical faculty that "dentistry was of little consequence, and the University being already overtaxed, such action could not be taken." Thorpe in his biography of Solyman Brown says: "It was at a meeting of prominent New York dentists, Dr. Brown suggested, 'Why not have an independent dental college?' This suggestion was seconded by Dr. Jahial Parmly and Dr. Harris, who returned to Baltimore, and with Drs. Hayden, Bond and Baxley founded the Baltimore College of Dental Surgery." This led to the application for a charter and the establishment of an independent dental school. From the beginning this college was a distinct success, two students, Drs. Mackall and Arthur, being graduated from the first course, March 9, 1841, and an increasing number of graduates were turned out thereafter. In 1844, Dr. Hayden's death occurred and Dr. Harris became president of the college, which position he held until his death in 1860. In 1843 the college had a demonstrator of mechanical dentistry, and in 1846 also a demonstrator of operative dentistry and an infirmary.

In 1902, Mr. Ernest W. Keyser molded in relief the heads of Drs. Hayden and Harris, and two bronze tablets were cast and presented, one to the Baltimore College of Dental Surgery and the other to the dental department of the University of Maryland, during the winter of 1902–1903.

The museum of this college contains many objects of historic interest, a molar from the mouth of Amadeus I, King of Spain, and another from George IV of England, also the death masks of Benjamin Franklin, Sir Isaac Newton, George III, Zip (Barnum's "What-is-it" of circus days) and a set of teeth made for George Washington by John Greenwood.

When the Baltimore College of Dental Surgery was organized it appears to have followed the example of the American Society of Dental Surgeons in the matter of granting degrees, except that the latin degree *Chirurgiæ Dentium Doctor* was conferred, the proper abbreviation of which would be

C.D.D., although the translated initials D.D.S. have always been used.

Harris in the first edition of his *Dictionary of Dental Surgery* defines the word "doctor" as "a title . . . properly confined to one who has received from a regularly chartered institution or college the degree of doctor of medicine or doctor of dental surgery. The power of conferring the latter degree was first invested in the Baltimore College of Dental Surgery by the legislature of the State of Maryland, by an act of incorporation granted in 1840."

FIG. 42

OHIO COLLEGE OF DENTAL SURGERY.

This college was the second of its kind, and was organized in 1845, only six years after the establishment of the Baltimore College of Dental Surgery. To the efforts of Dr. James Taylor its establishment was largely due, and he, with Dr. Jesse W. Cook and Melancthon Rogers, constituted the first teaching faculty.

This college was the father of scientific dentistry in the West, since at the time of its establishment a traveling tooth tinker was on a par with the kettle and umbrella mender. In the spring of 1845, a charter having been obtained, the trustees met and Dr. B. O. Aydelotte was elected president and Dr. Israel M. Dodge, secretary. Dr. Jesse W. Cook was elected dean and professor of dental anatomy and physiology, Dr. Rogers was made professor of pathology and therapeutics, while Dr. Taylor was professor and demonstrator of practical dentistry and pharmacy.

This college continued in existence as an independent school, with a number of changes in the faculty and a gradual increase in teachers and subjects, until 1888, when it became the dental department of the University of Cincinnati, and this arrangement was continued in force until 1906, since which time it has been operated as an independent dental college.

In 1881, the death of Dr. James Taylor, who had been a faithful teacher for thirty-six years, occurred. The college is still in existence and is contributing much to the advancement of dentistry, with Dr. Henry T. Smith as dean. This college holds the honor of having graduated the first woman dentist, Miss Lucy B. Hobbs, on February 29, 1866 (*Dental Register*, March, 1866).

THE PENNSYLVANIA COLLEGE OF DENTAL SURGERY

Philadelphia College of Dental Surgery.

The first step toward organizing a dental school in Philadelphia was taken December 16, 1845, when the leading dentists of Pennsylvania met in Philadelphia and organized the Pennsylvania Association of Dental Surgeons.

Immediately after the organization was complete a committee was appointed to obtain a charter from the state legislature for a dental college to be located in Philadelphia. This committee on making the necessary application met with unexpected opposition. A school to teach the art and

practice of dental surgery was a new idea to the members of the legislative body, and, furthermore, some influential members of the profession who were earnest in urging the matter in the beginning now opposed a new school and favored arranging for dental instruction in connection with an existing medical school, notwithstanding that all efforts in that direction had been without result.

The Philadelphia College of Dental Surgery.—About 1850, Hon. Jesse R. Burden, a member of the legislature and the president of the Philadelphia College of Medicine, obtained a charter for a dental college, which he offered to the committee of the association on condition that while they were free to elect the faculty he reserved the right to be the president and to name the board of corporators. To avoid further delay this offer was finally accepted and the Philadelphia College of Dental Surgery, fully organized and equipped, opened its doors October 29, 1852, Dr. Elisha Townsend delivering the introductory lecture.

The faculty consisted of Drs. J. D. White, Ely Parry, Robert Arthur, Elisha Townsend and T. L. Buckingham. The fees were for each professor $15, demonstrator $10 and diploma fee $30. The new college proved from the first a decided success.

Trouble soon developed, however, between Mr. Burden and his board of corporators and the faculty. The Philadelphia College of Medicine, of which he was president, was very lax in the matter of granting degrees, and he attempted to introduce the same laxity in the new dental college. This the faculty very properly resisted, claiming that they alone were competent to pass upon the qualifications of those upon whom the D.D.S. degree was to be conferred. Toward the close of the fourth session the faculty, finding that the way was open for obtaining from the state legislature a new charter, decided to resign and reorganize under a new name and charter more to their liking, with a board of corporators in harmony with their views.

Of the sixty-three graduates of the four sessions of the Philadelphia College of Dental Surgery many achieved

success at home and abroad, or served their profession with credit as instructors, investigators and inventors. Preëminent among these may be named Drs. Louis Jack, C. Newlin Peirce, James Truman, J. Foster Flagg and James E. Garretson as gentlemen who have reached a well-earned position of prominence in their profession to which but few attain.

The Pennsylvania College of Dental Surgery.—Through Mr. Charles Hamilton, of Philadelphia, a retired business man of means and with influence at the state capital, an application was made for a charter to the state legislature, then in session, and an act incorporating the Pennsylvania College of Dental Surgery was promptly passed and signed by the Governor, April 3, 1856. This act or charter closes with the following significant clause: "No degree shall be conferred, whether honorary or upon the qualified students of the college, without the written request of the faculty." This made impossible any controversy on the point which had proved so troublesome.

In selecting the board of corporators, four members of the old board, who had proved loyal to the faculty, were continued in the new, supplemented by representative laymen and prominent members of the medical and dental professions, with Hon. Henry C. Carey as president.

The faculty consisted of Drs. Elisha Townsend, Ely Parry, J. F. B. Flagg and T. L. Buckingham, with Dr. Robert Arthur as dean. Various changes were made from time to time in the faculty, the board and faculty worked together harmoniously, and the classes constantly increased.

Near the opening of the sixth session dissatisfaction with the choice of a member of the faculty to fill a vacancy caused the resignation of Dr. J. H. McQuillen, and Dr. W. S. Forbes was promptly elected in his place. The rooms occupied by the college were required by the owner, making a removal necessary, and the withdrawal by its publishers of certain facilities for reaching the dental profession through the *Dental Cosmos* threatened seriously to hamper the college. These difficulties were energetically taken in hand by the faculty and the board, and the session opened on time in

larger and more convenient quarters. At this time the college began the publication of a quarterly dental journal, the *Dental Times*, which proved a valuable aid in keeping the college and its work before the profession during the ten years it was continued.

A little later Dr. McQuillen obtained a charter and organized the Philadelphia Dental College. This while at first thought to be an injury to the older school did not so prove. The older school continued to prosper and the new school has had a successful career and still continues as the dental department of Temple University.

About 1877, the University of Pennsylvania made overtures to the Pennsylvania College of Dental Surgery to unite with it as its dental department. After a full consideration of the project, four members of the faculty, Drs. Essig, Barker, Tyson and Darby, resigned to accept positions in the new venture. Drs. Mears and Buckingham decided to remain with the old school. Thus a second time the faculty was compelled to reorganize. This was accomplished by selecting Drs. C. N. Peirce, Wilbur F. Litch and Henry C. Chapman to fill the vacancies. The college moved into a much larger building, more desirably located, at the northwest corner of Twelfth and Filbert Streets. This building was remodeled so as to afford increased teaching facilities and refurnished. When the session opened in the new location it was the best equipped dental college building in the world. The teaching staff was largely increased and the sessions lengthened from four to five months.

In 1892, to provide still better facilities, a property at the northeast corner of Eleventh and Clinton Streets was purchased and the buildings thereon remodeled and enlarged to meet college requirements, but very soon even this building was crowded. The college, however, here reached its zenith. Changes in methods of instruction and additions to the curriculum in a few years so increased the cost of maintaining a dental school that one after another the independent colleges were compelled either to close or to unite with institutions not entirely dependent upon the fees from students.

The time came when this question was pressed upon the Pennsylvania College of Dental Surgery. This matter was given thoughtful consideration by the faculty and the board, and they finally decided, after the close of the fifty-third session, June, 1909, to close the doors of the school.

Later the buildings were sold, all of its debts and obligations settled, its charter and records and the balance of its funds, amounting to some $18,000 after due legal process, were turned over to the trustees of the University of Pennsylvania, in trust, to be used for library and dental research purposes, June, 1918, and the Pennsylvania College of Dental Surgery ceased to exist. During its long career it had graduated over 3000 students.

HARVARD DENTAL SCHOOL.

The first school in the New England States to prepare men for the practice of dentistry was the dental department of Harvard University Medical School. Although six schools preceded Harvard none were established north of New York and only one north of Philadelphia.

In 1865, the late Dr. Nathan C. Keep, president of the Massachusetts Dental Society, gave expression to the general feeling then existing in New England that dental students should not be compelled to go to distant states for their education, and suggested that Harvard University might institute such a course, and upon action by the society a committee was appointed to confer with the officers of Harvard Medical School. The dental committee drew up plans for a school which were approved by a committee of the medical faculty March 29, 1867. After full investigation the corporation voted on July 17, 1867, to establish the dental school. Utilizing the faculty of medicine, and adding three new professors to teach the strictly dental branches, the school thus organized opened its doors and began its first lecture season of four months in November, 1867.

Nearly all of the members of the faculty held the medical degree, and a controversy arose as to the degree to be granted

by the new department, some holding to the D.D.S., and others favoring the M.D. degree. As no classical institution had ever granted the degree of D.D.S., and the question was a new one, a compromise was finally reached whereby the word "Dentariæ" was prefixed to the old title of "Medicinæ Doctoris," and D.M.D. was granted instead of "Chirurgiæ Dentium Doctoris." Thus far Harvard stands alone in creating and granting this new degree, which was officially approved February 27, 1869, all other schools except Tufts, which grants the D.D.Sc., being content with the degree adopted by the Baltimore College of Dental Surgery.

At first two years were required for graduation, and accordingly March 6, 1869, six candidates received the degree of D.M.D. Harvard Dental School early decided that it would know no color lines, and hence at the first commencement the dental doctorate degree was conferred on Robert Tanner Freeman, of Washington, D. C., who was the first colored man to receive such a degree.

In 1871, laboratory instruction was introduced in the departments of anatomy, physiology, surgery and chemistry, and in the same year the corporation voted, at great disadvantage to itself, to discontinue the custom of allowing a practice of five years to be equivalent to the first year of study, believing that it was the function of the college to train men and not to confer degrees on those already partly or wholly trained. This school maintained this standard unassisted for many years.

On November 13, 1871, owing to ill health, Dr. Keep resigned his professorship and was succeeded by adjunct professor Chandler.

In 1876, the length of the term was extended to eight months, and two years were required for graduation. Beginning with 1885 an entrance examination in physics and English was demanded, and in 1890 orthodontia was added as a separate branch of study. In 1891, the course was extended to three full years, despite the fact that each advance in requirements caused a temporary falling off in attendance. In 1904, a new order of entrance requirements was put into

effect, requiring all applicants not holding a degree of some kind to pass the examination for entrance to Harvard College.

Harvard has never been a large school and may never become one, as it is the aim of the faculty to do all in its power to raise the standard of dental education regardless of the number of students that it graduates.

Many other colleges that have had a long career and done noble work cannot receive attention here for lack of space. To tell the complete story of all would fill volumes.

CHAPTER XIV.

DENTAL JOURNALISM.

In the field of dental journalism we find that the same master minds that first conceived the idea of a dental college and a national association of dentists are also responsible for the first dental journal.

AMERICAN JOURNAL OF DENTAL SCIENCE.

The *American Journal of Dental Science*, the first number of which was issued in June, 1839, began operations as a private enterprise, with Chapin A. Harris as editor and a publishing committee consisting of Eleazer Parmly, Elisha Baker and Solyman Brown. It was backed by dentists of means in New York and elsewhere, who sought for some better method for the dissemination of such professional knowledge as then existed. Up to this time only two works had been published in America by American authors that were considered suitable as text-books, one by Samuel S. Fitch in 1829 and another by Chapin A. Harris in 1839.

The *American Journal of Dental Science* continued as a private enterprise, publishing reviews of the current dental books and writings until September, 1841, when the newly organized American Society of Dental Surgeons took charge of the magazine as a part of its work. Dr. Solyman Brown was made associate editor to Dr. Harris and the journal was changed from a monthly to a quarterly publication. It is interesting to note that the first state law regulating the practice of dentistry, passed by Alabama, December 31, 1841, was recorded in this journal. The discovery of ether and chloroform are also recorded in the seventh and eighth volumes. The journal did not prove to be a financial success under association management, and in 1850, Dr. Chapin A.

Harris purchased and continued it as a new series and as a private enterprise until his death in 1860, when the journal died with its illustrious editor.

In May, 1867, Snowden & Cowman, of Baltimore, began the publication of a journal of the same name, but it had nothing to do with the original periodical, and no journal since published can be considered as a continuation or successor to that journal. Although the magazine was not a financial success, it fulfilled its mission in opening and paving the way for dental journalism and bringing the profession into closer fellowship.

DENTAL REGISTER.

The *Dental Register*, formerly *The Dental Register of the West*, was founded at Cincinnati in 1847, with Dr. James Taylor as editor and publisher, assisted by Dr. B. B. Brown of St. Louis, under the auspices of the Mississippi Valley Dental Association. In 1851, Dr. Taylor purchased the magazine and continued to conduct it for six years longer, when it was transferred to Drs. Taft and Watt, who assumed its publication until 1859. Mr. John T. Toland, who conducted a dental supply house in Cincinnati, then purchased the magazine and retained Drs. Taft and Watt as editors. Mr. Toland severed his connection with the magazine in 1861, and Dr. Taft again became its publisher until 1872, when its publication was assumed by Spencer and Moore, who succeeded to the business established by Mr. Toland, Drs. Taft and Watt continuing as editors. In 1874, the firm became Spencer & Crocker, and later the Samuel A. Crocker Co., by whom the *Dental Register* is now published. Dr. Watt retired as editor in 1873 and Dr. Taft filled this post until 1900, when he retired after forty-four years of service, and the editorial department has reposed in the hands of Dr. N. S. Hoff, of Ann Arbor, Mich., since that time. The *Dental Register* is the oldest publication of its kind in the world, the *Dental Cosmos* being a successor to and not a continuation of the quarterly *Dental News Letter*, publication of

which was begun in the same year as that of the *Dental Register.*

The *Dental Register* was founded in 1847 by men who had the best interests of the dental profession at heart and has been published continuously ever since, and is now in its seventy-fourth volume. It has taken a leading part in the propaganda for the appreciation of the value of dental services by the laity, publishing and circulating booklets on that subject.

DENTAL NEWS LETTER AND DENTAL COSMOS.

The next publication of note was the *Dental News Letter,* published by Jones, White & Co., of Philadelphia, which appeared in October, 1847, and its publication was the special care of Mr. John R. McCurdy, a member of that firm. It was issued as a quarterly of sixteen pages, and its object was both to advertise the firm's goods and to disseminate professional knowledge by the publication of scientific articles, its subscription price being the very nominal sum of fifty cents per year. The magazine was successively enlarged through twenty-four, thirty-two, forty-eight, sixty-four to eighty pages in the ninth volume, and in 1853 Dr. J. DeHaven White became chief editor with Mr. John R. McCurdy as assistant.

In August, 1859, after twelve years, Mr. McCurdy retired from the firm and the journal was changed to a monthly publication and its name to *The Dental Cosmos,* with Dr. J. DeHaven White as editor-in-chief. After two years Mr. Jones retired from the firm and both the business and the publication of the journal were continued by Dr. Samuel S. White, with Dr. J. DeHaven White as editor and publisher of the journal.

In 1865, Dr. J. DeHaven White resigned as editor and his place was taken by Dr. J. H. McQuillen, who served in that capacity until 1872, and was then succeeded by Dr. J. W. White, brother of S. S. White. Dr. Samuel S. White died in 1879 and his business was incorporated in 1881 as the

S. S. White Dental Manufacturing Co., the new firm continuing the publication of the journal as in the past.

On May 27, 1891, Dr. James W. White died and was succeeded as editor by Dr. Edward C. Kirk, who has ably managed the editorial department until the present time. This magazine from the beginning has stood for the highest ideals in the dental profession, and has been our most aggressive and important publication in that field. The ablest writers on dental subjects have always been glad to have their ideas recorded by this journal.

DENTAL OFFICE AND LABORATORY.

The publications of Johnson & Lund, of Philadelphia, for a series of years had a wide circulation. The first, the *Dental Quarterly*, began March, 1862, and ended with the sixth volume. This was followed by a dental newspaper entitled the *Dental Office and Laboratory*, the first number, a folio with four pages of reading matter and four of advertisements, appearing in March, 1868. At the close of the fifth volume it was discontinued. In April, 1877, its publication was resumed as a folio of ten pages, and in January, 1887, it appeared as a quarterly in octavo form and completed twenty-two octavo volumes. It was finally discontinued in November, 1908. In all, this firm published about forty-three volumes. The first fifteen volumes are exceedingly rare and few complete files are in existence.

ITEMS OF INTEREST.

In 1879, Dr. T. B. Welch began the publication of a journal entitled *Items of Interest*, intended to disseminate knowledge in regard to the use of amalgam in filling teeth, publishing articles on that subject by Dr. J. Foster Flagg and others who had made a study of this filling material. After several changes the Consolidated Dental Manufacturing Co., of New York, assumed the publication and ownership of this journal in July, 1896, appointing Dr. R. Ottolengui as editor. Under

its new ownership and editorship it proved a decided success and now occupies an important place in dental journalism. This magazine publishes many original papers as well as extracts from current dental literature and events of note to the profession.

During the present year (1921), the Consolidated Dental Manufacturing Company failed and this journal was temporarily suspended, but was later purchased by the Dental Items of Interest Publishing Company, and resumed publication with the same staff as heretofor, Dr. Ottolengui continuing as editor.

DENTAL BRIEF.

Another dental journal, entitled *Welch's Monthly*, appeared in August, 1896, with Dr. T. B. Welch, founder of *Items of Interest*, as its editor and A. S. Robinson, of Philadelphia, as publisher. The next year its title was changed to the *Dental Brief*, its publication being assumed by the L. D. Caulk Co., of Philadelphia. In 1900, Dr. Welch, being advanced in years, was succeeded by Dr. Wilbur F. Litch, who held the post of editor until his death, December 25, 1912. He was succeeded by Dr. Alfred P. Lee, of Philadelphia, who served as editor until publication of the journal was discontinued with the December issue of 1913. During its life it was one of our leading dental journals and contained many original and well-written articles. Its passing was a distinct loss to dental journalism.

DENTAL DIGEST.

The *Dental Digest* is a later arrival in the field of dental journalism. It was founded by the Dental Protective Association in January, 1895, to protect the profession against oppressive and illegal patents. It was conducted by Dr. J. N. Crouse, of Chicago, who also conducted a coöperative dental supply company. The journal contained extracts of current dental literature as well as many original papers, the editorial work being in the hands of Mr. D. H. Crouse,

son of Dr. Crouse. In 1906, Mr. Crouse died and his place as editor was taken by Dr. J. P. Buckley, who continued in that position for three years.

In 1909, the magazine was purchased by the Dentists' Supply Co., of New York, who installed Dr. George Wood Clapp, well known as a writer of dental literature, as editor. The magazine has won fame as the vehicle for the writers of the new school on prosthodontia, including Williams, Gysi, Tench, Sears and others. It was the first dental magazine seriously to undertake a professional presentation of the economics of dental practice.

THE JOURNAL OF DENTAL RESEARCH.

(CONTINUING THE JOURNAL OF THE ALLIED DENTAL SOCIETIES.)

This *Journal* seems to have had its outgrowth from the *International Dental Journal*, formerly published at Baltimore, the first copy of which is dated January, 1880. After a few years, it was taken in hand and fostered by an association of New York dentists who furnished the necessary financial backing. It was the outgrowth of a desire to free dental journalism from the influence of dental-supply houses and other commercial interests.

When other dental journals reduced their subscription price, the *International Dental Journal* was unable to meet the reduction, and was discontinued at the close of the twenty-sixth volume, December, 1905. The gap thus created was immediately filled by the *Institute of Stomatology* of New York and three Massachusetts dental societies who began the publication of a quarterly dental journal entitled the *Journal of the Allied Dental Societies*, with Dr. F. L. Bogue, who had been an active contributor to the old *Journal*, as editor. The editorial staff was gradually enlarged to include a dozen or more able men and other societies were added from time to time, these constituting the *Association of Allied Dental Societies, Inc.*, who acted as owners and publishers.

In 1918 a move for a new and larger publication was set on foot by Dr. William J. Gies, of Columbia University. The editorial staff of the old journal became interested, and became members of the staff of the new journal which was to be known as the *Journal of Dental Research.* An initial editorial staff of sixty-seven members was chosen from the leading investigators in all departments of dentistry and stomatology. Accordingly, the *Journal of the Allied Dental Societies* was discontinued with the thirteenth volume, December, 1918, and immediately succeeded by the *Journal of Dental Research,* a quarterly publication of increased size and importance.

No higher tribute can be paid to this journal than to say that it is published solely by, of and for the dental profession, accepts no advertising and is not dominated by commercial interests in any way but gives free expression to the views of the various editors without fear or favor, and is devoted solely to the moral, ethical and scientific upbuilding of the dental profession.

JOURNAL OF THE NATIONAL DENTAL ASSOCIATION.

The most important recent arrival in the field of dental journalism is the *Journal of the National Dental Association,* which is now in its seventh year.

For many years the need of an independent dental journal with proper support had been felt, but it appears that the first decisive step was taken at the annual meeting of the National Dental Association, at Boston, 1908, when a committee, which had been appointed to consider the project, recommended in favor of such a journal. This was further agitated at the 1909 meeting, and it was urged that publication begin in 1910. Nothing further seems to have been done until November, 1913, when the proceedings of the National Dental Association were published quarterly in bulletin form. Beginning with March, 1915, the *Bulletin* was changed to the *Journal of the National Dental Association* and published as a quarterly until January, 1917, since

which time it has been issued monthly. It is regularly sent to every member of the association and also to non-members in this country upon payment of the subscription price, two dollars per year. Being the organ of the National Dental Association, it is assured of a large circulation and ample financial backing, factors which make it attractive to the ablest writers in the dental profession. It is well edited by Dr. Otto U. King, and its character and purpose are too well known to need further explanation.

Many other dental journals have appeared from time to time; some have long since ceased to be published and others are of comparatively recent origin. The majority of these have been the property and means of advertising the goods of various dental manufacturers and supply houses, and though used largely for advertising purposes, they have been filled with valuable scientific papers that have contributed much to the upbuilding of dentistry.

CHAPTER XV.

DENTAL ASSOCIATIONS AND SOCIETIES.

We are indebted to Dr. L. Parmly Brown (*Dental Cosmos*, August, 1920) for the information that the earliest dental society to be formed in this country was **The Society of Surgeon Dentists of the City and State of New York,** founded December 3, 1834. There seems to have been another society of dentists in western New York State about 1837, which became affiliated with the former society, but just what became of these societies is not exactly clear. Whether they disbanded or merged into the American Society of Dental Surgeons is not definitely known. There can be but little doubt that they formed the nucleus from which Drs. Hayden and Harris were able to organize the latter association and to obtain support for the first college and journal, since it is a matter of record that most of the meetings looking toward these moves were held in New York City. It was also at one of these meetings that Dr. Solyman Brown first suggested, "Why not have an independent dental college," when the medical colleges had refused to teach dentistry.

In the constitution and by-laws of the New York Society, provision is made for "granting diplomas and of doing and performing such other acts as may be expressed in said charter," but there is no record that this society ever carried out this provision. The society also published a notice in Shearjashub Spooner's *Guide to Sound Teeth* (New York, 1836, p. 112), which read in part: "The society has organized itself, a library is being established and a course of lectures on the subject of the profession is annually to be delivered."

AMERICAN SOCIETY OF DENTAL SURGEONS.

The first society of dentists of national scope was the American Society of Dental Surgeons, organized in August, 1840. As early as 1817, Dr. Horace H. Hayden expressed himself in favor of such an organization, but nothing was

accomplished at that time. However, due to the efforts of Drs. Hayden and Harris and a number of prominent dentists from several states, a meeting was held in New York in 1840, at which the American Society of Dental Surgeons was organized, and Dr. Hayden was elected president and Dr. Harris secretary. Dr. Hayden continued as president until his death in 1844, after which Dr. Eleazer Parmly filled that position until 1853, when Dr. Elisha Townsend was chosen president.

In 1841, there was considerable disturbance in regard to the propriety of using amalgam as a filling material, and in 1843, the society passed a resolution condemning its use as malpractice and forbidding the same by its members. As a result the membership of the society was reduced materially until 1850, when the amalgam protest was rescinded, but this did not satisfy the profession at large with the association's attitude in the matter, as amalgam was at that time coming into general use.

In May, 1855, Dr. Townsend, then president, called a meeting to consider the dissolution of the society. At the next meeting, held in New York in August, 1856, a quorum was not present and the society adjourned *sine die*.

In some recent researches into dental history, Dr. L. Parmly Brown has given us the following history of the degree *doctor of dental surgery*. Several dentists made use of the title of "doctor," "dentist," "surgeon dentist" and "dental surgeon" prior to 1840. A. B. Hayden announced himself as "dental surgeon" in 1828, but the first authentic use of any such title appears to have been when the American Society of Dental Surgeons was organized.

The original by-laws of the society provide that "Each and every acting Member or Fellow of the Society . . . shall be entitled to a Diploma, or Degree of Doctor of Dental Surgery"; and that "Each and every Honorary Member . . . shall receive the Diploma, or Degree of Doctor of Dental Surgery by paying therefor to the Treasurer of the Society, the sum of Ten Dollars."[1] There can be no doubt

[1] Am. Jour. Dent. Sci., 1, 165.

that membership in the society in its earliest years, automatically conferred the degree regardless of the diploma. Thus the D.D.S. as well as the M.D. is appended to the name of Chapin A. Harris as the author of an article in the *American Journal of Dental Science* for January and February, 1841, shortly before the first college commencement; and on Robert Arthur's diploma from the college, dated March 9, 1841, now in the Thomas W. Evans Dental Museum and Institute at Philadelphia, and generally considered the first dental college diploma ever issued, both Horace H. Hayden and Chapin A. Harris sign their names with M.D., D.D.S. Hayden never had any dental degree except that of the society, while Harris received his only college D.D.S., honorary, from the Philadelphia Dental College in 1854. In the *Journal* for 1841, No. 1, vol. 2, the names of Solyman Brown and L. S. Parmly appear with M.D., D.D.S., appended, whereas the honorary degree of the Baltimore College was not conferred upon Solyman Brown and the two Parmlys until February 18, 1842.

It appears that members were only admitted to this society and diplomas granted them after a most thorough examination to test the qualifications of the practitioner.

There is apparently no evidence that the society's D.D.S. was conferred after 1843, which indicates that it was abandoned about that time, and probably was considered to have been rendered superfluous by the degree of the college, with which the distinguished members of the society had been honored. It may safely be assumed that the faculty of the college would not remain long in favor of the granting of degrees by the society. (*Dental Cosmos*, August, 1920, 62, 936, Dr. Brown's article.)

MISSISSIPPI VALLEY ASSOCIATION OF DENTAL SURGEONS.

This association was organized in Cincinnati, Ohio, August 13, 1844, for the object of elevating the profession without distinction of persons. Like its predecessor, it also passed

the anti-amalgam resolution, but did not forbid its use. In 1847, the society issued a quarterly publication, the *Dental Register of the West.* It soon became the leading dental society of the West, and by its broad-mindedness escaped much of the turmoil which characterized the American Society of Dental Surgeons. Dr. Jesse W. Cook was elected the first president and Dr. James Taylor corresponding secretary, and the society continued to hold meetings regularly at the Ohio College of Dental Surgery until 1881.

When organized, this society had a large area for its activities, and its meetings furnished the only opportunity many widely scattered dentists had for social and professional intercourse. As time passed, dental societies were organized at various points that brought these opportunities nearer home, and it ceased to have more than a nominal existence. The following from the *Dental Review* (1895, 9, 326) may be considered its obituary: "The celebration of the fiftieth anniversary of the Mississippi Valley Dental Society, at Cincinnati, April 17 and 18 (1895), was highly successful. The address of the president, Dr. Taft, was timely and suggestive. Several scientific papers were read, and the history of the society and interesting reminiscences from some of its older members received the closest attention from the more than one hundred in attendance. Dr. Custer exhibited his new porcelain furnace and baked a piece successfully before the audience."

The following year, April 15 and 16, it held a meeting for the purpose of unveiling a tablet in honor of Dr. James Taylor, who did so much to build up the profession in that section of the country. This was a fitting close to its long and honorable career and was the last meeting of which we have any record.

Dr. Henry T. Smith was secretary at the time of disbanding and retains the records at 116 Garfield Place, Cincinnati, O.

AMERICAN DENTAL CONVENTION.

This was the second national society of dental surgeons in the United States, and was organized in anticipation of

the failure of the first, due to the arbitrary rulings of its leaders. It was organized at a meeting held in Philadelphia, August 2–4, 1855, on far more democratic principles than was its predecessor. Dr. Townsend was its chief organizer. Dr. John S. Clark, of New Orleans, was elected president, and Mr. J. M. Crowell, of New York, secretary. This convention included in its membership scientific men who were not dentists but who were engaged in closely allied work. More than eighty dentists joined the convention at its first meeting, and we are told that when the third session was held at Boston, one hundred and ninety names were on the roll.

The first obstructive rock in the course of the convention was in 1856, when an attempt was made to provide a fund for scientific research. This was objected to on the ground that we should do our own thinking instead of paying others to do it for us.

There was also much complaint that the proceedings were not in keeping with the progress of the day in other branches of science. Dr. J. H. McQuillen complained that "Social and political dogmas that have stood undisturbed for centuries, recognized of all men as true and real, vanish into thin air before the sharp scrutiny of modern inquiry."

There was a feeling that the convention was a failure, but from entirely different causes from those that wrecked the American Society of Dental Surgeons. The society continued in existence until 1876, when it seems to have been abandoned because of the more progressive American Dental Association. It was apparently conceived at an inauspicious time, and rocked in the cradle of adversity while this country was passing through some trying times. Considering this, and the fact that it was a great stimulus and help to many of our profession, it should not be regarded as a failure.

AMERICAN DENTAL ASSOCIATION.

The American Dental Association, one of the forerunners of our present National Dental Association, was founded at

Niagara Falls in August, 1859, as a result of the efforts of Dr. J. H. McQuillen, of Philadelphia, and others. It met with much opposition, especially from the members of the American Dental Convention in session there at the same time, and to correct some of the objectionable features of which this new association was organized. Due to the state of war which lasted from 1861 to 1865, meetings were not regularly held or well attended, the attendance of one hundred and twenty-four at Chicago in 1865 being the high-water mark at that time.

So wisely was its organization carried out and its objects set forth, that its influence in the advancement of dentistry is scarcely measurable. It sought wisely to avoid the rocks that had wrecked the two preceding associations of the same kind.

Its membership being composed of delegates from other societies, and also of permanent members, furnished a most admirable method of advancing dentistry as a profession, and its growth and usefulness were uninterrupted, save during the Civil War, until it was merged into our National Dental Association in 1897. Dr. Thomas Fillebrown, a member of the American Dental Association, was instrumental in bringing about this consolidation of the two societies.

SOUTHERN DENTAL ASSOCIATION.

The Southern Dental Association, the other branch of our present National Dental Association, was organized at Atlanta, Georgia, on July 28, 1869. The organization was largely brought about by the efforts of Dr. W. T. Arrington, of Memphis, Tenn. Dr. James F. Knapp, of New Orleans, was the first president; Dr. W. H. Morgan, vice-president; and Dr. F. J. S. Gorgas, of Baltimore, secretary. The initial membership of the society consisted of forty-eight, and included in this number were such men as the officers named above and many others of like reputation.

It soon outgrew its bounds as a Southern organization, and increased in numbers and territory until it became as much

a national organization as its sister, the American Dental Association, holding meetings in St. Louis, Baltimore, Chicago and New York.

For thirty consecutive years the Southern Dental Association held meetings which were especially noted for harmony and brotherly feeling. After several attempts to change it into a national organization, this purpose was accomplished when it was united with the American Dental Association in 1897 to form the present National Dental Association. These two associations were practically duplicating work, and no one man did more to consolidate them than Dr. B. Holly Smith, of Baltimore.

NATIONAL DENTAL ASSOCIATION.

This association, as before stated, owes its origin to the union of the American Dental Association and the Southern Dental Association, which was brought about largely by the efforts of *Dr. B. Holly Smith*, of Baltimore, who began to agitate the matter while he was president of the Southern Dental Association in 1894. His efforts were ably seconded by Dr. Thomas Fillebrown, a member of the American Dental Association, and through the agitations of these two men, committees were appointed from both associations, who perfected arrangements by which the two associations were consolidated at a joint meeting held at Old Point Comfort on August 5, 1897. At this meeting, as a fitting reward for their efforts, Dr. Thomas Fillebrown was elected president and Dr. B. Holly Smith secretary of the new association.

For ten years the new association did not show any great growth, but continued to hold its regular meetings and to function as a separate and distinct society, having little or no connection with other dental societies.

Dr. William Carr, who was president of the National Dental Association in 1907, in his presidential address, emphasized the importance of increasing the membership. The following is taken from his address:

"Another matter which well deserves careful consideration

is the question of an increase in membership of this association. For a number of years there has been a disposition on the part of many members of the profession, whether connected with the National Dental Association or not, to form a new national organization on the ground that this association is narrow and so limited in its membership that it does not fairly represent the dental profession of this country."

Dr. George E. Savage, president of the Massachusetts Dental Society, in his presidential address in June, 1908, made the first recommendation relative to the reorganization of the National Dental Association. In accordance with his recommendations, on July 28, 1908, the Massachusetts Dental Society petitioned the National Dental Association for the approval of the following suggestions and resolutions:

"1. That steps be taken immediately to establish a representative journal of the society.

"2. That steps be taken immediately to reorganize the society and enlarge its membership.

"3. That such tariff changes be made as the foregoing changes may render necessary.

"4. That the reorganization of the society shall be along the lines of the American Medical Association and that all members in good standing of state, district and county societies, and such other societies as may be determined upon, be eligible for membership in the National Dental Association."

Dr. William Carr was the first president of the National Dental Association to make specific recommendations relative to reorganizing the society. These were presented to the society in his address in 1908, at the meeting held in Boston. It was at this meeting that the recommendations made by the Massachusetts Dental Society were presented and adopted.

The first committee on revision of the constitution and by-laws consisted of Drs. J. D. Paterson, chairman; B. Holly Smith and S. A. Hopkins. This committee was afterward enlarged to five by the addition of Drs. R. Ottolengui and Homer C. Brown.

Dr. Rodriguez Ottolengui presented the first draft of the constitution and by-laws modeled upon the constitution of the American Medical Association at the Boston meeting in 1908. Dr. Ottolengui was also the most ardent supporter, editorially, through *Items of Interest*, of the reorganization of the National Dental Association. At this time the total membership was about seven hundred out of a total of thirty-six thousand practising dentists in this country. At the 1908 meeting, Dr. V. E. Turner, of Raleigh, N. C., was elected president, and it was during his administration that the work of reorganization was set in motion, but for two years thereafter not much progress was made beyond appointing committees and arousing sentiment.

In 1910, President *Burton Lee Thorpe* in his address referred to the reorganization matter, and spoke as follows:

"At this session it was proposed to reorganize this society on broader lines, making its scope and character more representative, thus extending the field of dentistry and rendering more honorable service to the public health. The matter of the proposed revision of the constitution and by-laws has been under consideration for two years.

"On account of the meager and unsatisfactory responses, and evident disinclination on the part of the various state societies to accept the proposed plan of revision, it seems to me that it would be the part of wisdom to defer action for another year, and in the meantime invite all state societies to send representatives to a conference meeting to be called before the next annual session, and thereby endeavor to formulate changes and modifications which will receive the approval of the various state organizations and the profession generally.

"Threats have been made by some that if this society is not reorganized according to the plan of the American Medical Association a rival association will be the ultimate result."

Dr. Homer C. Brown, corresponding and later recording secretary of the National Dental Association, is entitled to special mention because of his splendid administrative work. Dr. Brown, at the Denver meeting, appealed to all state

societies, inviting them to coöperate for definite results and to send delegates to the conference in Cleveland in 1911. After the plans for reorganization had been tentatively adopted at Cleveland, Dr. Brown waged a vigorous campaign through correspondence and by visiting various state societies, thus securing action which resulted in the consummation of the entire reorganization plan.

There were many other loyal men in our profession who nobly assisted in helping to achieve success in this great undertaking, and should be given credit for the signal work done in various state organizations.

Prior to the Cleveland meeting in 1911, six societies, having thirteen hundred and eighty members, voted to unite with the National Dental Association if it reorganized. Of these, Maine, Vermont and Massachusetts promised to bring in their entire membership.

Ohio was the first state to pass a resolution appointing a delegate and alternate and endorsing the plan that members of a state or local society may be eligible to join the National, provided the fee be not more than two dollars annually.

Another noteworthy fact is that the National Dental Association in its revision work followed the constitution and by-laws of the American Medical Association, preparing one which was almost a duplicate of it.

This resulted in a complete reorganization of the association at the meeting held in Washington, D. C., in 1912, and the vesting of authority in a house of delegates to be elected by the component societies, twenty-five of which had signified a willingness to become affiliated. Members of the army and navy dental corps and others of like standing were made eligible, and the dues to all were put at one dollar per year, each member to receive the *Journal* free of cost, publication of which was provided for in the new constitution.

The following officers were elected: President, Dr. Homer C. Brown, Columbus, Ohio; first vice-president, Dr. Charles C. Allen, Kansas City, Mo.; second vice-president, Dr. M. L. Rhein, New York City; third vice-president, Dr. H. H. Johnson, Macon, Ga.; general secretary, Dr. Otto U. King,

Huntington, Ind.; and treasurer, Dr. H. B. McFadden, Philadelphia, Pa.

The first board of trustees included the following: Dr. H. J. Burkhart, Dr. Thomas P. Hinman, Dr. J. P. Buckley, Dr. Thomas B. Hartzell, Dr. E. R. Warner, Dr. Clarence J. Grieves, Dr. A. R. Melendy, Dr. Frank L. Platt and Dr. C. L. White.

At the time of reorganization the association had but eight hundred members, but within five years its membership had reached twenty thousand.

During the year an effort was also made to get a bill through Congress to relieve the medical and dental professions from oppressive and illegal patents, due to the methods of Dr. Taggart and others.

Dr. Rodriguez Ottolengui, in an editorial which appeared in *Items of Interest* in August, 1913, in commenting on the permanent reorganization of the National Dental Association, says:

"It is a part of history, but it is past history. Of the differences, antagonisms, disputes and delays we can afford to be silent. The one big, important, imposing item of news is that all obstacles have been swept aside. That ever-zealous settler of conflicts, General Compromise, has brought harmony where a few had predicted chaos, and the grand reorganization is an accomplished fact. The dream of years has been brought to bountiful fruition; opportunity is knocking at our doors. Let those in command beware lest we overlook the call, for upon the shoulders of a comparatively few men rests a grave responsibility. The enlarged association is but as clay in his molding, lest the finished piece carry permanent records of personal ambitions where naught but unselfish effort should prevail.

"The writer cannot but feel that the men elected to high places will all prove deserving of their preferment, and that they will work together to perpetuate the new association and mold it into a homogeneously working, powerful machine which shall unceasingly produce results which shall be in the interest of humanity."

Due credit must be given to the administrative officers who have conducted the affairs of the National Dental Association since its reorganization in 1912. These men have felt the responsibility of leadership and have nobly discharged their duty to the profession and humanity.

On July 17, 1916, the dues were increased to two dollars per member, to become effective January 1, 1917, in order to provide funds for a *research institute*. The association even before its reorganization had a *committee on scientific research*, which made an extended report on scientific investigations of saliva in 1911. These and other investigations were conducted by this committee until September 25, 1915, when the Research Institute of the National Dental Association became a corporate body. It had an endowment of buildings and equipment valued at $52,000, and one of the greatest steps forward in dental advancement was made when, on February 7, 1916, the institute was formally opened at 8803 Euclid Avenue, Cleveland, Ohio. By June 20, 1916, the research fund had reached the sum of $69,000, which was to be used for salaries of technicians and laboratory expenses. Much valuable work was done by the institute in investigating substitutes for platinum and the disease-producing possibilities of mouth bacteria.

Despite the good work done by the Research Institute it met with discouragement, and the following is quoted from the address of Colonel Logan, president of the National Dental Association at Boston in 1920:

"I am not making any excuses for our splendid research workers, for they have accomplished wonders in their various fields. I am simply attempting to stimulate some faint hearts that have become critical because of the-to-them poverty of results that have been attained. By reason of the work of our research men we have attained a position in the minds of scientific men that we would never have reached in any other way, and it is our duty and should be our pleasure to support them in every possible manner. I therefore bespeak for the Research Commission in its various activities

the earnest support and coöperation of every member of the Association.

"The Research Institute of the National Dental Association has resolved to discontinue its activities and dispose of its properties and turn the proceeds over to the Research Commission for the prosecution of their work. The institute has not been a failure by any means, and its assets, which will be the property of the National Dental Association from this time, have more than doubled. The purchase of the building at Cleveland was a good piece of business, for the property, which was bought at a price of $52,000, is now worth $112,000.

"The hope is expressed that similar institutions will be inaugurated in various sections of the country to attempt to carry on the work that the institute was designed to do."

There was in this announcement a feeling of disappointment, for there was considerable sentiment connected with the original plans announced in the inception of this institution. The Research Institute was inspected by the Carnegie Foundation and received an adverse report relative to meeting the requirements of that institution for financial assistance. The officers and trustees of both the Institute and the National Dental Association decided that it would be many years before the dental profession would be able to meet the requirements outlined by the Carnegie Corporation. In view of the fact that the institute was not going to be in a position to receive endowments from philanthropic sources, it was thought best to sell or lease the same. The assets included in the Research Institute represent an endowment from which the profession will always receive an annual income. This disposition of the Research Institute assets made it possible to give immediate assistance to other scientific workers in the dental field.

Larger appropriations will be available for research work in the form of grants to those institutions or individuals qualified to do such work. A dental college or individual doing real scientific work and desiring financial assistance can appeal to the Research Commission for an appropriation.

The change in the plans of our research work in no way

affects the contributions being made by state societies for research. The Research Commission is collecting from the membership approximately $25,000 a year. This together with the money received from the interest on the Research Institute Fund will make a greatly increased sum of money for research each year. The cost of maintaining and operating the Research Institute will now go direct to research work. Additional grants have already been given to universities and individuals, so that there should be during the coming year an increased spirit of research permeating the dental profession.

The monthly journal had its inception when the National Dental Association, in 1913, conferred on the secretary the privilege of publishing a little bulletin. For eighteen years the journal committee of the National Dental Association had been endeavoring to establish its own mouthpiece, but each year made a brief report "asking to be continued." However, with the inauguration of the *Bulletin* the plan was conceived that this could very easily be made the foundation for a monthly magazine that would be owned and controlled by the dental profession. The *Journal* has grown and developed from a small bulletin to a quarterly journal and from a quarterly journal to a monthly journal which today has the largest circulation by thousands of any dental magazine published. The advertising pages in the *Journal of the National Dental Association* command a higher rate than that of any other dental magazine. Expert accountants who have been called in to investigate the assets and the good will report that it is now worth over $150,000.

The assets of the National Dental Association in the last seven years have increased from practically nothing to over $300,000. Plans were laid at the annual meeting in Boston in 1920 for the raising of an endowment of $500,000 during the next five years. Such a fund should establish the National Dental Association on a firm banking and business basis and so bring solidarity to the organization. In fact, it will be able by such a plan to duplicate what the American Medical Association has done for medicine.

The Relief Fund in 1913 was approximately $3500. During the last few years a thorough systematic campaign has been promulgated, so that every member of the National Dental Association has been kept in close touch with the importance of this work. The result of this campaign has been that $54,000 is now in the Relief Fund Endowment. Not only the plans adopted for the sale of Christmas seals, but the publicity work done through the *Journal* should be given due credit for the success of this commendable undertaking.

STATE SOCIETIES.

Next in importance come the state dental societies, of which each state has at least one, and in many states there are local or city societies of considerable importance. Many of these societies are very old. The *Pennsylvania Association of Dental Surgeons*, dating from December 15, 1845, is the oldest dental society now in existence. The *Michigan State Dental Society* dates from 1855, the *Indiana State Medical Association* from 1858, and there are several others nearly as old.

It is an interesting fact, and one not generally known, that the first dental society ever formed was the Society of Surgeon Dentists of the City and State of New York, which was organized December 3, 1834, and appears to have been in existence until about 1840, when the American Society of Dental Surgeons was formed.[1]

As the history of state societies is mostly of local interest, a discussion of them will not be entered into here.

AMERICAN INSTITUTE OF DENTAL TEACHERS.

Prior to 1893 the movement for the systematic teaching of dental technics, instituted by Dr. G. V. Black in 1888, was confined to a very few colleges. The original article dealing with the subject of dental technics, by Dr. Black, published

[1] See Dr. Brown's article in Dental Cosmos, August, 1920, **62**, 936.

in the *Dental Review* for July, 1888, and an editorial by Dr. E. C. Kirk are about all the contributions upon this subject up to that time. The incentive for the organization of the National School of Dental Technics came from the reading of two papers by Dr. Black, the one referred to above and the other read at the World's Columbian Dental Congress in Chicago, August 18, 1893.

It was at this meeting that the organization first took place and the society was then known as the *National School of Dental Technics*. Dr. H. A. Smith was selected as temporary chairman, Dr. D. M. Cattell was elected president and Dr. J. A. Dale secretary. The membership was limited at that time to colleges belonging to the National Association of Dental Faculties, and all members of that body were invited to become affiliated. The work of the school was carried on vigorously for several years and was devoted to the best methods of teaching operative and prosthetic technics, and by its efforts, technic courses were established in all dental schools within a few years.

At the meeting in Cincinnati, December 28–29, 1898, the field of dental pedagogics having broadened in the meantime, a motion was carried to amend the constitution and call the association the *Institute of Dental Pedagogics*, and the scope of the organization was enlarged to include methods of teaching all of the subjects then included in the dental curriculum.

The institute is not a legislative body in any sense, but its work lies in its members being mutually benefited by an interchange of thought and a comparison of methods of teaching the subjects in their respective fields. Membership is made up principally of college faculties as a whole rather than individual members of faculties, and the personnel consists of such delegates as may be appointed each year by the respective faculties. Several men, however, have been made permanent or life members because of distinguished or meritorious services.

At the meeting of the Institute of Dental Pedagogics in December, 1908, a committee was appointed to establish a

dental index bureau, following a paper read before the institute on that subject by Dr. Arthur D. Black, of Chicago, the plan being to prepare card indexes according to subjects and authors of all of the more important articles in dental magazines, but nothing decisive was accomplished at that time. At the annual meeting held in Chicago, January 24, 1912, a movement was inaugurated to change the name to the American Association of Dental Teachers, but this was not accomplished until January 29, 1914, when the name *American Institute of Dental Teachers* was adopted instead.

At the Pittsburgh meeting of the institute, during the last week of January, 1918, most of its attention was given to postgraduate teaching and war dentistry, these subjects having assumed great importance by reason of our entry into the World War and the need of quickly training a large number of dentists for military service.

Index of Dental Literature.—Under the auspices of the institute, Dr. Arthur D. Black, president, and Dr. Abram Hoffman, secretary, have, in addition to their other duties, recently undertaken a systematic indexing of all dental literature in the English language, which index is being published in book form. The first volume, covering the period from 1911 to 1915 inclusive, has been issued and others are under preparation and will be issued as rapidly as possible.

The institute has also taken an active part in securing the adoption of the four-year course in our colleges, and more uniform courses of study therein. The establishing of technic courses has been of great value in itself, and the institute has exerted tremendous influence in gradually unifying teaching methods. The work which is still being carried on by standing committees, dealing with the unification of courses and syllabi and the standardization of instruments and college bulletins, is obtaining excellent results. The work of the committee on nomenclature has been noteworthy, and its report of some years ago, standardizing a large number of dental terms, has been of great value both in teaching and in dental literature.

NATIONAL ASSOCIATION OF DENTAL FACULTIES.

The organization of this association took place in New York City, August 4, 1884, and had for its purpose the adoption of uniform requirements for graduation. A number of the most important dental colleges, ten at the beginning, effected the organization, and provision was made for admitting such other colleges as met with the requirements of the constitution. Dr. C. N. Peirce was elected president and Dr. H. A. Smith secretary. At this time the course consisted of two years, and the custom of accepting five years' practice as equivalent to one year of college work was discontinued.

In 1889, by its action, the dental course was extended to cover three years of not less than five months each, this rule to become effective with the session of 1891–1892. In 1896-1897 the school-year was increased to six months, and it was also decided that no person could be a member of the faculty of any dental college and also a member of a state board of dental examiners. The length of the term was increased from six to seven months, to become operative in 1899–1900.

By 1900 the number of schools in the association was thirty-seven, and it was decided that in 1902–1903 the preliminary educational requirement of students should consist of not less than a two-year high-school course. At a session of the association in August, 1901, a resolution was adopted to increase the dental course to four years, to become effective in 1904–1905; but at a special meeting which convened July 4, 1904, this action was rescinded. In 1907, the preliminary requirements were raised to three years' high-school work, to go into effect the same year, and in 1908 it was ordered that each school year shall consist of not less than thirty-two weeks, of six days each, of actual school work.

During the past few years the preliminary requirements have been raised to a four-year high-school course or its equivalent, and it has been decreed that beginning with the

session of 1921–1922, one year of college work, in addition to four years of high-school work, shall be required for matriculation to dental schools which are members of the association.

DENTAL FACULTIES' ASSOCIATION OF AMERICAN UNIVERSITIES.

At a meeting held in Boston, July 31, 1908, a conference was held between the representatives of the dental departments of the Universities of California, Harvard, Michigan, Minnesota and Pennsylvania for the purpose of considering the advisability of forming a faculties' association of the dental departments of American universities. A set of by-laws was drafted by Dr. James Truman for consideration. Dr. James G. Sharpe, of the dental department of the University of California, was elected temporary chairman. The next meeting was held at the Bellevue-Stratford Hotel, Philadelphia, June 5, 1909, for effecting a permanent organization. At this meeting, Dr. J. G. Sharpe presided and Dr. E. C. Kirk was appointed secretary *pro tem.* The dental departments of the University of California, Harvard University, University of Michigan, University of Iowa, University of Minnesota and University of Pennsylvania were represented at the meeting. Article II of the constitution reads as follows:

"The object of the Association shall be—to promote dental education; to improve the standard of preliminary education required for admission to dental schools; to establish reciprocal educational relations with its members, and ultimately to establish a national standard which may serve as the basis for a reciprocal interchange of dental licenses among the several states."

The membership was limited to dental schools which are a part of state universities or chartered universities of equal standing. Its powers are both executive and educational. The secretary is required to keep a record of matriculants, reports of dental examiners, dental college announcements and other matters of special interest to the association.

The standard of preliminary education adopted was a four-year high-school course or its equivalent. At the 1910 meeting a resolution was introduced to amend the by-laws so as to admit colleges acceptable to the Carnegie Foundation. At this meeting the question of extending the course of dental instruction to four years was also taken up.

At the annual meeting in Iowa City, March 8, 1911, the resolution introduced at the preceding meeting was passed admitting colleges acceptable to the Carnegie Foundation, and a resolution was adopted approving one year of post-graduate work in lieu of a four years' course at that time. At the Boston meeting, April, 1913, the question of standardizing a four-year predental course was taken up, as also the question of the rating of students from foreign schools. At this time the number of schools belonging to the association was six, and one additional application was on file. In February, 1915, at Philadelphia, the association voted to begin a four-year course in dentistry as soon as possible, and never ceased in its efforts to secure a broader and better education for dentists, and it was largely through its efforts that beginning with the school year of 1917–1918 the course in dentistry was increased to four years, consisting of at least forty-four hundred hours of laboratory and didactic instruction.

NATIONAL ASSOCIATION OF DENTAL EXAMINERS.

The National Association of Dental Examiners was organized at Lexington, Ky., and shortly thereafter a meeting was held on August 6, 1883, at Niagara Falls, for the purpose of perfecting the organization, at which meeting Dr. J. Taft was elected president and Dr. George H. Cushing secretary. The object of this association was to promote coöperation among the various state boards in securing a higher standard of education and uniform qualifications of dental practitioners. The membership of the association consisted of the boards of examiners of the various states.

The most notable achievements of this association so far have been the interchange of licenses between boards and

the tabulation of the results of the examination of students from all the colleges, for the purpose of ascertaining which are doing most efficient work. During 1916 the tabulating committee of the National Association of Dental Examiners made an extensive report on the standing of the various dental colleges before the state boards, showing the average percentage of failures to be 16.6. The report of the same committee for the year 1917 showed a percentage of failures of 13.6, an improvement over the 1916 report. They also made a combined report for the years 1910 to 1917 inclusive, showing the percentage of failures for that period to be 15.9. These reports formed the basis for the classification of dental colleges, which was announced by the Dental Educational Council of America at Chicago in July, 1918, and without it a classification would have been nearly or quite impossible.

On May 13, 1917, the National Association of Dental Examiners, in special session, arranged to hold such special sessions as may be necessary for examination of all applicants who have been properly certified for graduation and to make such other provision as may be necessary to protect the interests of dentists entering or honorably discharged from the military service.

It is largely due to the efforts of this association that higher educational standards have been adopted both for entrance and graduation requirements during the past few years.

DENTAL EDUCATIONAL COUNCIL.

The Dental Educational Council of America was organized at Denver, Colo., in July, 1910, and consisted of a committee of five delegates each from the National Association of Dental Faculties, the National Association of Dental Examiners and the National Dental Association. The objects of this council are to advance dental education and to unify the standards of various national bodies of the dental profession, to inspect various dental colleges with a view to ascertaining the character of the work done, to perfect a model curriculum and to make a study of the dental

laws of the various states for the purpose of securing greater uniformity of the same. One of the most important achievements of the council has been the examination and classification of our various dental educational institutions. At the meeting of the Dental Educational Council of America at Chicago, July, 1918, a classification of dental schools was adopted in which sixteen schools were placed in class A, twenty-seven in class B and four in class C.

The lengthening of the dental educational course from three to four years, beginning with the session of 1917–1918, was another important accomplishment. This action was urged by the bodies composing the council and by the American Institute of Dental Teachers. As early as 1915 several of the leading universities decided to begin the four years' course in the fall of 1917, and all of the dental societies of national scope had committed themselves in favor of lengthening the dental curriculum. By the time the fall term 1917 opened, practically all of the reputable schools had arranged to extend their course of study to four years of thirty-three weeks each.

DENTAL PROTECTIVE ASSOCIATIONS OF THE UNITED STATES.

The Dental Protective Association of the United States was organized by **Dr. J. N. Crouse**, of Chicago, in 1888, when it was quite common for patent claimants to collect unjust and exorbitant royalties from the members of the dental profession. The memories of the exactions of the Goodyear Dental Vulcanite Co. under the Cummings patent were still in the minds of the profession, and the claims of the International Tooth Crown Co., which controlled patents on the Richmond crown and Low bridge, threatened to renew these abuses unless something was done.

Drs. J. N. Crouse, Truman W. Brophy and E. D. Swain were made a board of directors and Hon. Lyman J. Gage became treasurer. The fee was $10 for each member, and over seven thousand dentists joined the association. Since

this association was organized it has to a great extent succeeded in preventing patent claimants from abusing the profession. Up to 1895, the *Dental Digest* informs us, the Dental Protective Association had won every suit brought against any of its members except one with the International Tooth Crown Co. in regard to the Low bridge patent, which was still pending. Later, this suit was also won in 1900 and the profession was put at ease for a time. Shortly after this the parties who had been defeated approached Dr. Crouse with the offer of a vast sum of money if he would only allow them to win two or three suits against the association. This offer was promptly refused and the fight continued as loyally as before.

When the *Taggart gold inlay controversy* began to develop there was a great division of sentiment, many dentists fearing a renewal of the Goodyear Dental Vulcanite Co. and Tooth Crown Co. abuses, while there were those who believed that the profession owed much to Dr. Taggart for his valuable invention, and it was with the latter that Dr. Crouse aligned himself. On December 5, 1910, Dr. Crouse and the other officers of the Dental Protective Association entered into an agreement with Dr. W. H. Taggart by which members of the association were to pay Dr. Taggart $75 for his machine and the privilege of using his casting process, or $15 for the use of the process alone. The price which Dr. Taggart had been asking previously was $110 for the machine and process, or $50 for the process alone. This action on the part of Dr. Crouse immediately produced a storm of protest from those who were not convinced that Dr. Taggart's claims were valid and thought that Dr. Crouse was perverting the purpose for which the Dental Protective Association was formed instead of carrying the matter into the courts and testing the validity of the Taggart patents.

On January 6, 1911, a notice appeared in the *Dental Cosmos*, over the signature of Dr. Mark F. Finley, chairman, committee for the defence, in which he roundly scored Dr. J. N. Crouse for entering into a conspiracy with Dr. W. H.

Taggart and thus perverting the function of the Dental Protective Association from its purpose of protecting the profession against oppressive and illegal patents, and admonished the members of the profession to await the outcome of the Taggart-Boynton suit. Shortly thereafter this suit was decided in favor of the defendant and the prestige of the Dental Protective Association and its officers suffered a distinct reverse, though it can hardly be charged that Dr. Crouse acted other than what he thought to be for the profession's best interest. During his life, Dr. Crouse was one of the founders and president of the Illinois State and Chicago Dental Societies, president and treasurer of the Dental Protective Supply Co., president of the National Dental Association, and publisher of the *Dental Digest* until 1908. He died in Chicago January 16, 1914. The association is still in existence.

The suit brought against Dr. Boynton by Dr. Taggart was regarded as a test suit and the defence was conducted by a committee appointed by the National Dental Association. In the meantime another association, known as the **National Dental Protective Association,** was formed with Dr. Richard Summa president and Dr. M. F. Finley secretary, having for its purpose the work that Dr. Crouse had abandoned.

When Dr. Boynton's suit had been won in Washington, Dr. Taggart started another suit in Illinois, and it was again necessary to renew the fight in the interest of the dentists. Another society was organized in Chicago, known as the **Dentists' Mutual Protective Alliance,** founded in 1914, with Dr. J. Clinton Grant as corresponding secretary, to conduct the defence. Dr. Taggart was successful in getting a decision in his favor in one of the lower courts, but this decision was reversed by the higher courts in 1918 and the profession was relieved of the danger of further litigation.

The latter two protective associations have been merged into one, with headquarters at Chicago, leaving two dental protective associations still in existence.

FÉDÉRATION DENTAIRE INTERNATIONALE.

The International Dental Federation was established as an outgrowth of the Third International Dental Congress, held in Paris in 1900, and from relatively small beginnings has become the leading factor in international dental affairs. Through the influence of the Fédération Dentaire Internationale the widely varying standards and ideas prevailing in different countries in regard to the preparation and education of dental students have, to a certain extent, been eliminated, with the result that a standard curriculum has been evolved and adopted by several countries. The federation is also concerned with teaching methods and the question of the relation of dentistry to the public service, public dental hygiene and the care of the teeth of school children. Army and navy dental service, dental nomenclature, bibliography and history have also received consideration.

In an editorial in the *Dental Cosmos*, October, 1913, the activities of the Fédération Dentaire Internationale are explained and commented on extensively. It seems that the activities of this organization are of a moral and academic nature, and it is without authority to enforce its findings. Notwithstanding this fact, however, the federation has done much for the uplift of dentistry by a friendly exchange of thought.

Following the death of **Dr. W. D. Miller** a memorial fund was raised in his honor for the purpose of rewarding those who make the most notable contributions to the advancement of dentistry. The first prize from this fund was awarded to **Dr. G. V. Black,** of Chicago, at the London meeting, August 1, 1911.

At the London meeting of the Fédération Dentaire Internationale, held in August, 1914, many members were absent on account of the outbreak of the World War, as were also many members of the International Dental Congress held at the same time. When these two organizations adjourned it was with the understanding that they would not meet again until peace had been restored in Europe.

PREPAREDNESS LEAGUE OF AMERICAN DENTISTS.

During the progress of the World War it soon became apparent that the United States would be involved before the conflict reached a termination. The need of becoming organized and ready for any emergency that might arise was felt in every walk of life. It was believed that the dentists should be in a position to do something to place our men in the best possible physical condition upon short notice, if need be.

As no suitable organization was in existence to undertake such a task, the Preparedness League of American Dentists was organized by Dr. J. W. Beach, of Buffalo, who became its president. The league was under the direction of Dr. Charles F. Ash, of New York, and had the approval of the provost marshal-general and the surgeon-generals of the army and navy. The first session of the league was held in Buffalo July 25, 1916, with the following officers: J. Wright Beach, Buffalo, chairman; H. A. Pullen, Buffalo, vice-chairman; and M. B. Eshleman, Buffalo, secretary. The league was duly endorsed by the National Dental Association at the Louisville meeting and its *Journal* was made the official organ of the league.

The objects of the league were: (1) To take care of the teeth of candidates for the army and navy recruiting offices; (2) to organize and prosecute study; (3) to seek commissions in the Officers' Reserve Corps; (4) to equip dental units for base hospital or field service; and (5) to introduce the teaching of war oral surgery in the dental colleges. The motto of the league was: "Of the Profession, for the Profession and for Our Country, if need be." Its main object was to maintain a registration bureau of all the dentists of the United States who agreed to prepare the mouth of at least one worthy applicant for military service; the fee for such registration was one dollar.

The Philadelphia *North American*, July 6, 1916, quotes Col. J. Warner Hutchins, head of the Pennsylvania State Commissary Department, as follows: "Thirty per cent. of

the men who apply for enlistment in the National Guard are rejected because of bad teeth." This gives one some idea of the enormous amount of work to be done by the league. By the time war had been declared by the United States the Preparedness League, in addition to its other duties, had already begun active study of the effects of gunshot, shell and shrapnel wounds upon the jaws and face.

On November 1, 1917, the league had six thousand members, who had performed a total of 111,000 operations for our soldiers. It is recorded that by the time the war had ended the Preparedness League had performed 375,000 gratuitous operations for men selected for military service. In addition to this it contributed three dental motor car ambulances to the government.

With the ending of the World War the necessity for the Preparedness League as a war measure ceased, but in view of the noble work done by this organization it was decided to continue the same in existence, with such necessary changes as might be apparent to make the organization useful in time of peace. One of the first undertakings of the league was a modern course in post-war surgery. It was also planned to give free dental service to the needy families of disabled soldiers and sailors and to seek out and extend aid wherever it is needed and can properly be rendered by an organization of this kind. Its intentions are to coöperate with the Red Cross, National Dental Association and other similar organizations in rendering such aid, and so to broaden its scope as to become an international organization.

The league has recently been engaged in collecting a fund for the relief of dentists who had been rendered destitute by the recent World War.

CHAPTER XVI.

TWO GREAT BENEFACTIONS.

Forsyth Dental Infirmary. Eastman Dental Dispensary.

Time was when no one ever thought of doing more for the teeth of children than to extract them when they caused pain or obstructed the eruption of the permanent set. A first molar was always regarded as one of the temporary set until too far decayed to be reclaimed. Time has wrought changes in this as in other matters, and with the advent of preventive medicine it became apparent that something should be done to save the teeth of our children until they were old enough to see the importance of it themselves.

Not long ago, Dr. Charles H. Mayo, of Rochester, Minn., said: "It is evident that the next great step in medical progress in the line of preventive medicine should be made by the dentists. The question is, will they do it?" Boston and Rochester have already answered this question through their public-spirited citizens, and it is hoped that this move, emanating from these two cities, may become contagious, for in no other way can the great mass of our young children be rescued from the blighting effects of oral sepsis.

FORSYTH DENTAL INFIRMARY FOR CHILDREN.

The Forsyth Dental Infirmary for Children was founded by John Hamilton and Thomas Alexander Forsyth in memory of their brothers, James Bennett and George Henry Forsyth, and was incorporated in 1910 by a special act of the Massachusetts Legislature. On June 4, 1912, the corner-stone of the building was laid, with appropriate ceremonies, by John Hamilton Forsyth, who with his brother, Thomas Alexander Forsyth, founded the infirmary and provided a munificent

endowment of $2,000,000, in addition to the cost of the building, for the perpetuation of its work as a memorial to their deceased brothers. On November 24, 1914, the magnificent structure was formally dedicated. The occasion was a notable one in view of the fact that this was the first enterprise of the kind in the history of public benefactions.

The object of this infirmary is to care for children with defective teeth, adenoids and diseased tonsils, so that when they reach the age of sixteen years they shall be in good physical condition.

During the year ended November 1, 1916, the infirmary performed 151,215 operations of all kinds for the children attending the clinics. This shows in a striking manner the popularity of the institution, which had been in operation less than two years.

A postgraduate school of orthodontia was conducted in connection with the infirmary for several years. This was later given up upon a proposal by the Harvard Dental School for an affiliation with Forsyth Infirmary for the organization of a postgraduate school to be known as the Harvard-Forsyth Postgraduate School of Orthodontia, under the direction of Dr. Alfred P. Rogers as dean. The school has been conducted on a plan somewhat similar to that of the previous one except that its teaching is carried out on a broader scale, especially from the standpoint of the coöperation of a large number of prominent orthodontists from all sections of the country.

The work of the research department of Forsyth Infirmary is becoming of increasing importance and the interest in the reports and findings is growing. The study of dietetics has been developed quite extensively for its very marked action upon the teeth. Looseness of the teeth, loss of their supporting structures, carious condition of the maxillary bones, softening of the teeth, and effects very similar to caries have been produced on small laboratory animals. The department has been able for the first time on record to produce experimentally pyorrhea and caries in guinea-pigs by deficient and irregular diets. These experiments open a large

field and necessitate extensive and intensive chemical and biological study for their proper elaboration.

The training school for dental hygienists, originally organized in 1916 by the Forsyth Infirmary and conducted as such for three years, has since 1919 been affiliated with Tufts College Dental School and is now known as the Forsyth-Tufts Training School for Dental Hygienists. While Tufts College has always coöperated not only with the infirmary in general but with its training school in particular, it has now assumed a definite connection and a still greater interest in the welfare of the training school.

On January 20, 1917, a dinner was held in Boston in honor of Mr. Thomas A. Forsyth, on which occasion he was also presented with a loving cup with appropriate ceremonies. The cup was purchased by contributions from more than four thousand dentists situated in all parts of the world.

The infirmary is governed by a board of eleven trustees, five of whom are business men, four dentists and two physicians. It is now in operation at The Fenway (No. 140), a central location easily accessible by street cars from all parts of greater Boston. It occupies the central portion of a large tract, with sufficient reserve space on every side to ensure for all time an uninterrupted light. Forsyth Park, with a width of seventy feet, is on the east side, Fenway Park is on the west and north and there is a sunken garden on Hemenway Street in the rear. The infirmary is approached from Huntington Avenue, through Forsyth (formerly Bryant) Street.

In formulating a working policy for its development the trustees decided at the outset that to accomplish the greatest good the new institution must aim at something higher than the mere repair and extraction of carious teeth, the correction of oral deformities and the treatment of adenoids and tonsils. It was recognized that the prevention of disease was equally if not more important than its treatment, and it was further thought that the institution should be developed on so high a plane of technical perfection that it should stand in the same relation to the dental profession that the hospital bears to the medical profession.

The objects of the institution, as outlined in its reports relative to the education of the public, remedying existing conditions and establishing a higher standard of dental asepsis, are being accomplished with very gratifying results.

ROCHESTER DENTAL DISPENSARY.

At a meeting of the Rochester Dental Society held July 20, 1915, announcement was made by Dr. William W. Smith of the gift of a dental dispensary to the city of Rochester by **Mr. George Eastman,** founder of the Eastman Kodak Co., the dispensary with its endowment to represent an investment of about $1,200,000 and to be the finest institution of its kind in the world. The dispensary was to be built and equipped by Mr. Eastman at a cost of $300,000, with an annual contribution for its support of $30,000 for five years, and at the end of that time an endowment of $750,000, with the provision that the city provide for an appropriation of $20,000 per year for five years, and also that citizens pledge $10,000 per year for the same period. The dispensary was completed and dedicated May 9, 1917, with appropriate ceremonies, which were presided over by Dr. Harvey J. Burkhart, director. Later, Mr. George Eastman added $250,000 to the endowment of the Eastman Dispensary, bringing the total amount to date up to $1,500,000,

It is the aim of the Rochester Dental Dispensary to demonstrate the value of preventive dentistry and to carry out this plan by establishing a **dental hygienists' school** for the education and training of young women to do prophylactic work in the prevention of decay of the teeth by conducting a survey of children's mouths in order to ascertain the need of dental or other services, and where the family is without funds to take care of such work in the dispensary; by aiding the school authorities in examining the mouths of backward pupils; by conducting a series of lectures in schools and public institutions; and by organizing mothers' clubs, where the proper feeding and dental attention of babies may be taught. There will be a department for operations for cleft palate,

hare-lip and the removal of tonsils and adenoids, and the central dispensary will work in a general way for the benefit of children.

The building is located not far from the business center, and is convenient of access from all parts of the city by car lines. It is a beautiful, simple structure and contains the most modern dental and hospital equipment that could be obtained. Provision has been made for sixty-three dental operating units, and the hospital is furnished with every facility and convenience for nose and throat work. This institution was not established for the purpose of doing dental relief and repair work, but the fundamental thought was so to coördinate all of its activities that something might be worked out to prove the value of preventive dentistry. There is no doubt that while much good can be done and great suffering relieved by repair and relief work for adults, this work is of little value in determining what would be the proper method of treatment for children. An age limit of sixteen years has therefore been established.

This dispensary was opened for work on October 15, 1917. The following is a statement of the work during the first year: Tooth treatments, 57,653; root treatments, 24,903; abscess treatments, 11; prophylactic treatments, 23; root fillings, 2002; amalgam fillings, 20,168; cement fillings, 7267; synthetic fillings, 2776; gutta-percha fillings, 284; nitrate of silver, 654; capped, 198; crowns, 29; inlays, 3; extractions, 7824; *x*-rays, 177; orthodontia, 784; number of visits to dispensary, 49,122; number of patients, 6143; completed cases, 4409.

The work was done by licensed dentists (recent graduates). While the work done consists principally of fillings and ordinary dental operations, it was done with the thought of preventive dentistry always in mind.

The work of cleaning the teeth of the children in the schools is done by "squads" of licensed dentists and dental hygienists, the latter being trained in the school for dental hygienists conducted by the dispensary. The "squads" are provided with a portable equipment, consisting of a chair, engine, instruments, sterilizers, etc. All of the prophylactic

work—the cleaning of the teeth—is done at the various schools and institutions, under careful and strict supervision. A school lecturer is employed by the dispensary, who delivers illustrated lantern-slide lectures on oral hygiene and other health subjects. Lectures were delivered to 72,000 children in 1919.

CHAPTER XVII.

DENTISTRY IN THE UNITED STATES ARMY AND NAVY—WORLD WAR.

THE French Admiralty required their surgeons to have a knowledge of dentistry even before and during our Revolutionary War as a part of their general surgical training. It was probably due to this requirement that LeMaire and Gardette owed their knowledge of dentistry, which later proved of such value in this country. It is stated that while the French and Continental forces were encamped in winter quarters near Providence, R. I., in 1781–1782, Le Maire frequently performed dental operations for the officers and men, to their great satisfaction and relief.

Although sporadic efforts had been made by various nations to establish dental services in their armies, nothing of a permanent nature was done along that line until after the Spanish-American War. It was related that during the war between the North and the South several dentists were carried in the army hospitals of the Southern Confederacy, among whom was Dr. J. B. Bean, famed for his ability in treating fractures of the mandible with splints; but this organization perished along with the defeat of the Confederate Army.

The same form of splint was also invented by Dr. F. B. Gunning, of New York, in treating jaw fractures in the Union Army. Both of these gentlemen claimed the priority of the invention, but it appears that each of them perfected identical splints and published the results at about the same time independent of each other. These splints were made of hard rubber and were perfected soon after the application of that material to prosthetic uses.

This was about all the dental service that was given by the

Union Army except such as could be administered by hospital stewards and others who were equally inefficient, and their efforts were confined to the extraction of teeth and lancing of abscesses. Several efforts to have dental services established in the United States Army met with disfavor. The earliest record of any dental service of this kind in the army or navy was the appointment of a dental surgeon to care for the teeth of the cadets at Annapolis in 1852, which service has been continuous ever since.

In August, 1858, Dr. J. H. McKellops, of St. Louis, introduced a resolution in the American Dental Convention, which was given sufficient support to result in the appointment of a committee to call the attention of Congress to the necessity of providing dental services for the enlisted forces of the army and navy (*News Letter*, October, 1858). He lived to see his suggestion partially carried out in 1901, when contract service was provided for.

Jefferson Davis, while Secretary of War, is generally credited with making an effort to employ dentists in the army, but his efforts were interrupted by later developments.

On December 29, 1869, the Georgia State Dental Society petitioned the American and Southern Dental Associations to take steps to place dental services in the army and navy. This resolution was introduced by Dr. J. Y. Clark, of Savannah, who relates that when General Sherman entered Savannah with 100,000 men, every available dentist in that city was besieged from daylight until dark with cries for relief from dental suffering. The number of broken teeth and fractured jaws produced by unskilled operators and crude instruments, together with the rheumatic and neuralgic suffering due to oral disease, was heartrending.

In 1881, Dr. John S. Marshall addressed letters to Generals U. S. Grant and William T. Sherman, Admiral David G. Porter and others relative to the need of dentists in the enlisted forces, and while all were in favor of such action, nothing constructive was done until February 2, 1901, when Congress passed a law creating a corps of thirty contract dental surgeons for the army, attached to the Medical Corps

but without military rank. This legislation was generally unsatisfactory as a proper recognition of the dental profession, but it was generally conceded that to offer resistance might defeat the whole project, and on the theory that "a half loaf is better than none" it was agreed to accept this legislation and work for a commissioned status later. This legislation was the result of observations of the need of dental services on the part of soldiers during the Spanish-American War, especially in Cuba and the Philippines, and to the undivided efforts of the National Dental Association and Surgeon-General George M. Sternberg, covering a period of more than two years. The passage of this law gave the United States Army the first military dental corps ever attached to any army in the history of the world, and was the first opportunity given the common soldier to obtain dental service as a part of his medical attention. These dentists, however, were employed under contract rather than as a part of the regular army organization. Drs. John S. Marshall, Robert T. Oliver and Robert W. Morgan were appointed as an examining board for testing the fitness of applicants. Only thirty dental surgeons were employed under this act, and it was not until some years later that the number of dentists was increased to any extent. In 1902 the Surgeon-General recommended a bill to grant regular commissions to dental surgeons, but nothing came of this until 1908, when a bill passed the Senate to give these men a commissioned status, but this bill failed to pass the House.

The first act to commission dental surgeons was passed on March 3, 1911 (Bill H. R. 31,237), and created for them the rank of lieutenant only, with such allowances as were customary to that rank and a salary of $2000 per year. Not to exceed one dental surgeon to 1000 enlisted men, or a total of sixty, were allowed and such additional acting (contract) dental surgeons as might from time to time be authorized by law.

From this time on things progressed very well for the dental profession, and on August 27, 1912, Congress passed an act giving to dentists the same rank and precedence as

is given medical officers in the navy, creating a Naval Dental Corps and authorizing not more than thirty dental surgeons. In 1913, a Navy Dental Reserve Corps was created by Congress in addition to the active dental corps, and from which members of the active corps were appointed. Though the navy was the last to have a dental corps, it was the first to have the same properly provided for.

The beginning of the World War in 1914 brought the most momentous struggle in modern times and afforded the dental profession its first opportunity to prove its true worth. As an evidence of the importance of dentistry it is reliably stated that Germany, more than forty years ago, in preparation for "the day," began to perform dentistry in the schools, and that the results proving unsatisfactory the German children were being given prophylaxis in the kindergarten. In March, 1916, it was said that Germany had eight hundred dental surgeons in active military service.

The dental department of the American Ambulance Hospital in Paris was organized under the direction of Drs. Hayes and Davenport at the beginning of the World War, while this country was still neutral, and was supported entirely by voluntary donations from Americans. It was soon discovered when the conflict settled down to trench warfare that a very large number of the wounded had injuries of the face and jaws. The American dentists who were giving their services in this hospital did so entirely at their own expense. As an evidence of the value of their services a cable from Paris under date of April 26, 1918, announced the pleasing news to the dental profession that George B. Hayes and William Davenport had been made Chevaliers of the Legion of Honor for their splendid services at the American Ambulance Hospital in Paris.

For several years Congress made no provision for dental surgeons in the United States Army to be promoted above the grade of First Lieutenant, they having first to serve for three years or more as Acting Dental Surgeon at $1800 and then be commissioned at $2000. The highest possible salary after serving twenty years would then be $2800. It was also

provided that commissioned men in the Dental Corps should rank next below officers of the Medical Reserve Corps. The next step was contained in the army bill creating higher rank up to that of major for dental surgeons and also providing for a Dental Officers' Reserve Corps, passed June 3, 1916. This bill also abolished the position of acting or contract dental surgeon. Finally, on October 6, 1917, the President approved a bill passed by Congress, giving to officers of the Army Dental Corps the same rank in every respect as is given to officers in the Medical Corps. On August 29, 1916, Congress passed a bill authorizing the commissioning of dental surgeons in the navy at the rate of one for each 1000 of the authorized enlisted strength of the Navy and Marine Corps, to constitute the Naval Dental Corps and to be a part of the medical department of the navy and entitled to the same rank and pay of other medical officers to and including that of lieutenant-commander.

Repeated aggression on the part of Germany led this country to declare war on April 6, 1917. By June the selective draft laws had been passed, liberty bonds were on the market and five hundred army dentists were needed immediately. Application blanks and all necessary information in regard to obtaining commissions in the Dental Reserve Corps were distributed by dental journals, organizations and societies. The war found dentistry already organized and ready for quick action and the call to the colors met with a prompt response. In order to mobilize the dental resources of the country it was necessary to enlist the National Dental Association, the several state dental societies, the local dental societies, the classes about to be graduated from college and the Preparedness League of American Dentists.

The deans of thirty dental schools at their meeting in Washington, May 12, 1917, decided not to alter their courses of instruction to expedite the graduation of students, but to maintain existing standards of dental education and also recommend the establishment of a course on war dental surgery following a preparatory course for examination for the Officers' Reserve Corps. Shortly afterward a majority

of the dental schools of this country instituted gratuitous courses of special instruction for applicants desiring to enroll in the Dental Reserve Corps. These courses gave instructions in plastic and oral surgery and were attended by between 4000 and 5000 dentists up to the date they were discontinued in March, 1919.

Dr. William H. G. Logan, chairman of the Dental Committee of the General Medical Board, Council of National Defense, issued a call for a meeting of the deans of the dental colleges for Wednesday, July 18, 1917, for the purpose of considering the status of medical and dental students. Following this meeting, on August 29, 1917, the Secretary of War issued an order allowing hospital interns and medical students to enlist in the Reserve Corps until they had completed their studies; but the privilege was not extended to dental students at that time; but on September 4, 1917, an order was issued from the office of the Surgeon-General exempting second, third and fourth year dental students from military service. On October 6, 1917, the dental bill enacted into law contained a clause giving to dental students the same exemptions heretofore granted to medical students.

In this connection it is interesting to note that the Hon. Secretary of War, Newton D. Baker, is quoted as stating to a committee of deans representing the dental colleges of the United States, soon after the outbreak of war, that "The Army could, if necessary, get along without dentists." In reply to this apparent lack of an intelligent conception of the situation by a high government official, Dr. E. C. Kirk wrote an able editorial showing how we once "got along" without most of the things which are now every-day needs, and among other things says, "Doubtless we could get along without a Secretary of War, apparently lacking in appreciation of the importance of dental service to the health of those enlisted in the military forces of the nation" (*Dental Cosmos*, 1917, 59, 1024). Apparently Secretary Baker's view was not shared by Congress and other high government officials, since we find that Congress passed an act on October 6, 1917, giving dental

surgeons in the army advanced rank, as has been previously referred to.

In contrast to Secretary Baker's statement, Dr. Costello, of the Medical Reserve Corps of the United States Navy, is quoted as saying that "27 per cent of the rejections at the recruiting stations are for teeth which have been neglected until their condition is beyond repair," and it has been estimated that 20 per cent of the men in the military hospitals are there because of dental infections.

By October, 1917, Dr. S. Marshall Weaver, of Cleveland, working for and in behalf of the Preparedness League of American Dentists, reported plans for a standardized motor dental car and equipment suitable for use on the battle-front. This car contained a first-class working outfit equal to that in most dental offices, neatly and compactly arranged. Many ambulances of this type were later equipped and placed at the disposal of the A. E. F., though none were ever sent across.

In April, 1917, when war between this country and Germany occurred, the Army Dental Corps consisted of eighty-six officers on active duty and five officers in the Reserve Corps, and fifty-two dental surgeons in the Medical Department of the Navy. On November 11, 1918, when the Armistice was signed, there were 5000 dental officers on duty, 1500 holding Reserve Corps commissions and 1500 applications of enlisted dentists awaiting commissions in the Dental Corps of the United States Army and 448 dental surgeons on active duty in the navy. By authority of an act of Congress, July 8, 1918, the Adjutant-General, on September 30, 1918, issued an order for the commissioning before July 1, 1919, of over 9000 dental officers to fill the needs of an army of approximately 4,500,000 soldiers, thus establishing a precedent of approximately two dental officers to each 1000 enlisted officers and men, also making an increase in the number of dental assistants who shall be eligible to promotion as high as first-class sergeants.

Chief credit is due Colonel **W. H. G. Logan** for the rapid and efficient manner in which the dental forces were mobilized and equipped for the needs of the army at this critical time.

It was he who cut the traditional "red tape" and made it possible to commission and place on duty 5000 dental officers within approximately three months.

On January 24, 1914, at a meeting held at the Army and Navy Club, New York, the Association of Military Dental Surgeons of the United States was organized. The *ad interim* officers chosen were William C. Fisher, president and secretary *pro tem;* John D. Millikin, vice-president; and Ralph W. Waddell, treasurer. At the annual meeting in Rochester, July 7, 1914, the same officers were chosen except that Charles J. Lang was elected secretary.

The Dental Corps had made such progress during the first few months of the World War that on October 23, 1917, at the Astor Hotel, New York, there was a meeting of the Association of Military Dental Surgeons of the United States, with John D. Millikin president and Samuel Hussey secretary, with an attendance of about 300. The association is said to consist of about 3000 active members at the present time, all of whom are or have been in active military service.

On March 15, 1918, a school for army dental officers was instituted at Camp Greenleaf, Fort Oglethorpe, Ga., in connection with the Medical Officers' Training Camp, for military and professional instruction of dental officers and their assistants. This school gave to dental officers a two months' course of training divided between military and professional instruction and was, so far as is known, the first and only school in existence to give such instruction.

During the year 1918, due to the cutting off of imports and the necessity of keeping an adequate gold reserve on hand, the War Industries' Board restricted the use of precious metals, especially platinum, to such an extent that for a time it appeared that dentists would be seriously handicapped. Alloys of palladium were introduced by the Research Institute of the National Dental Association and were largely used to replace platinum, but, on the whole, were not so satisfactory. On November 15, immediately following the Armistice, all restrictions on the use of precious metals were removed.

On February 5, 1918, Senator Tillman introduced a bill to

provide equal rank between the Medical and Dental Corps in the navy. This bill was also introduced in the House by Representative Dyer. On June 30, 1918, Congress passed this bill giving dental surgeons equal rank in the navy with officers in the Medical Corps up to and including the rank of lieutenant-commander, and providing that dental surgeons shall be eligible for advancement in pay and allowances, but not in rank, to and including the pay and allowances of commander and captain, subject to such examinations as the Secretary of the Navy may prescribe. Under the terms of this bill the Reserve Corps was also provided for.

While this legislation is not all that could be desired, since the rank but not the pay of the dental surgeon is limited to the lower grades, it is believed that this handicap will in the near future be removed and the dentist placed on an equality with his brothers of the medical profession, as has already been done in the army. In fact, one very important advantage was obtained which was not accorded to any other corps in the service, and that was the dating back to original appointment of the rank and precedence of the original members of the corps who had seen service in the acting grades.

With the ending of the war, November 11, 1918, all active work declined and the great army of dental surgeons began to return to civil live. The allotment of one dentist to every 500 enlisted men was never put into effect owing to the sudden cessation of hostilities, and on January 4, 1920, an order was issued reducing the number of dentists to the old ratio of 1 to each 1000 of the total authorized strength of the army.

This is in strict contrast to the situation in the European armies, those of England and France for instance, which had no adequate provision for dental service, and depended to a great extent only on such dentists as could be found in the ranks.

DENTISTRY WITH THE AMERICAN EXPEDITIONARY FORCES.

Any history of dentistry in the army and navy would be incomplete if we did not take into account some of the

activities of the men who left our shores and all that was dear to them behind and cast their lot with the rest of our valiant army on foreign soil.

In July, 1917, twenty-six dental officers from the regular Dental Corps and Dental Reserve Corps embarked for France and constituted the first dental contingent of the A. E. F. Twenty of this number were assigned to the First Division, which arrived about the same time. In addition to these, thirteen dental officers of the Reserve Corps had been sent to France in May and June, 1917, but constituted a part of the Army Hospital Service that this country had loaned to England prior to the arrival of the A. E. F.

Each command carried its allotment of dental officers, and from this small nucleus the Dental Corps grew until at the signing of the Armistice, November 11, 1918, there were 1873 dental officers numbered in the A. E. F., with at least 2000 assistants and dental mechanics.

The Dental Corps was made up of 3 colonels, 9 lieutenant-colonels, 42 majors, 322 captains and 1497 lieutenants, most of whom came from the Dental Reserve Corps.

In May, 1918, a group of forty specialists in oral and general surgery was sent over by the Surgeon-General's Office. These were detailed to various hospitals, where they did excellent work in their respective lines. These officers of the Maxillo-Facial Unit were without equipment and instruments when they arrived in France, and it was necessary after purchasing such instruments as could be had to manufacture the remainder. After much confusion and many delays, dental equipment boards and supply depots succeeded in eliminating much that was cumbersome and supplying promptly that which was most essential.

Many men prominent in professional life were quick to enter the service of their country and distinguished themselves in this as they would have done in any other calling, and thus helped to enhance the services of the Dental Corps. The exigencies of the service, however, made it necessary to fill most of the higher administrative offices from those who had the longest experience in military service. The

greater number of our "overseas" men saw service in France, though some were detailed to England in hospital service and at training camps, and a few were detailed with their outfits and assistants to serve in Italy and northern Russia.

One of the first problems encountered was the inexperience of dental reserve officers entering the service in military methods and discipline. While they were undoubtedly good dentists, it was necessary to give them some special training to fit them for conducting a practice so different from that in civil life. A school was therefore organized in each of the divisions and placed under the supervision of a competent dental surgeon, and the benefits derived from such training were apparent in a very short time. These schools were continued until a similar course was instituted by the Army Sanitary School, organized December 3, 1917, at Langres. This course of instruction covered the approved methods of conducting a military dental practice and included face and jaw surgery, also a short course of study to qualify our men as auxiliary medical officers, in order to properly fit them for such emergencies as might arise. Special attention was given to first aid, bandaging, splinting, gassed cases, anesthesia, drill instruction, etc. In this way dental officers were able to assist the medical officers in emergencies, and in numerous cases they did so with credit.

An effort was also made to establish a post-graduate school in oral surgery and the organization had been practically completed for one at Neuilly, to be opened on April 1, 1918; but the enemy's offensive, begun March 21, filled all hospitals in that section with the sick and wounded and the project had to be abandoned indefinitely.

The effort to establish schools for the instruction of enlisted men as dental assistants and mechanics met with more success, two being established at Headquarters, First Depot Division, St. Aignan, and one at Red Cross Military Hospital No. 1, the latter of which gave an advanced course in the making of splints and other appliances used in maxillo-facial surgery.

The first divisions of 28,000 men each, arriving in France, carried an allotment of twenty dental officers, and in addition two dental officers with assistants and full equipment were assigned to each base hospital. It soon became apparent that this number would not meet the needs of the service and the number was increased to thirty for each division. Each division was supplied with a portable dental laboratory and a competent dental mechanic, who was detailed as assistant to the dental officer in charge, assuring the prompt construction of splints and other necessary prosthetic pieces.

All detached organizations, Engineer Regiments, Tank Corps organizations, Signal Corps, etc., were provided with necessary dental service, under the direction of supervising dental surgeons of the respective sections of the S. O. S.

Although many dental ambulances were built and equipped for use in France, none were transported and only two were actually put in service in the A. E. F., and these were donations made in France. The need of these was apparent, as they could move swiftly from place to place with equipment and supplies and render needed service with a minimum of lost time.

Boards of Examiners were appointed for conducting examinations of dental surgeons who had been drafted into the service and of Americans practising dentistry in Europe who were desirous of entering the army, and in this way the services of 128 dental officers were secured, and others would have been commissioned but for the signing of the Armistice.

The Surgeon-General's Office first contemplated that each dental surgeon should be properly equipped with and accompanied by a complete portable dental outfit, when going overseas, but on account of the difficulties attending transportation and the great haste with which men and supplies were sent to the front, much confusion resulted and many men arrived with no equipment. It was therefore necessary to make emergency purchases of supplies both in France and England. Two vessels, one English and one American, containing much dental equipment and supplies, were sunk by submarines, and this strained the supply depots to their

utmost. Added to this it was found that many of the portable dental outfits were too heavy and had to be abandoned for lighter equipment, it being necessary in many cases for the dentist and his assistant to carry a complete working outfit on their shoulders. By this means it was made possible for emergency treatment to be administered without delay to those in need of it.

A serious handicap confronted the Dental Corps during the whole of its activities by reason of the fact that proper provision had never been made for the accommodation of dental personnel. This resulted in the loss of much equipment and consequent loss of dental service until new equipment could be provided. In its first advance into combat the First Division had to abandon all dental equipment for lack of transportation facilities. This was later replaced with equipment of an emergency character only.

During the period of hardest fighting, from May to November, 1918, only simple dental operations, designed for the immediate alleviation of pain, could be performed, as every resource was utilized in the performance of the most important work of all, *defeating the enemy*. When active fighting ceased, and it was possible to do so, much important restorative work was undertaken to repair the damage which had resulted from neglect or injury during the period of intensive fighting. It is authoritatively stated that work of the highest character was performed during the period of relative inactivity ensuing between the Armistice and the final demobilization of the army. In order to secure the highest efficiency in this work, regular inspections were made of dental officers and their equipment.

Altogether seven dental officers were killed in action and several have been awarded the Distinguished Service Cross, or the Croix de Guerre. Several dental assistants were also lost in action. The first dental officer to make the supreme sacrifice was Lieut. **Weedon E. Osborne**, D.C., U. S. Navy, who lost his life in action while looking after the wounded of the Second Division, May 10, 1918. He was struck by a shell while carrying an officer to a place of safety. For

this, he was awarded the Distinguished Service Cross posthumously.

The return of the dental officers and their demobilization followed the natural and orderly course of the rest of the army, and was in striking contrast to the manner in which they were hastily sent over.

Particular credit is due Col. **Robert T. Oliver,** Chief Dental Surgeon, A. E. F., who arrived in France in July, 1917, and had charge of the organization and activities of the entire Dental Corps of the A. E. F., from that time until demobilization was practically complete in August, 1919. In spite of confusion and delay and handicaps that were beyond his control the organization was effected and its activities carried out in a manner that reflects only the highest credit on Colonel Oliver and his able corps of assistants. To him is largely due the credit for the recognition that has been accorded the dentist by our Government.

DENTISTRY IN THE TRAINING CAMPS.

Three thousand commissioned dental surgeons never saw service overseas, but that they did not was no fault of theirs. These men were either serving in the various camps and cantonments in this country or undergoing a course of training at some of the various schools established for that purpose while awaiting orders to proceed to France. So far as equipment is concerned they fared better than the dental surgeons with the A. E. F. For the most part well-equipped dental offices were soon set up and work of a high character was performed for soldiers entering the service, so that these men might be in the best physical condition when sent to the front.

Summing up the war activities we have: (1) The service performed by the Preparedness League of American Dentists for men selected for service; (2) the work done by dental surgeons in cantonments; (3) the work done at the front by dental officers in the A. E. F.; (4) reparative and reconstruc-

tion work undertaken at the several hospitals and by private dentists under contract with the office of the Surgeon-General.

The lessons to be drawn from these experiences are: (1) That one dentist to each 1000 men is insufficient, and that in case of war at least twice this number is necessary; (2) a sufficient number of light and fully equipped dental motor ambulances should be provided; (3) each dentist should be provided with a light portable outfit to be put into instant use when required; and (4) proper provision should be made for transporting dental equipment and supplies, and these be given priority shipment when required.

The record made by our men in the World War has been a most commendable one. The reconstruction of fractured jaws and facial features, the replacement of noses, lips and other parts mutilated or destroyed by gunshot wounds and other causes has far surpassed our most sanguine hopes.

CHAPTER XVIII.

DENTAL FRATERNITIES.

THE four Dental Fraternities of national prominence are, in the order of their founding, the Delta Sigma Delta, Xi Psi Phi, Psi Omega and Alpha Omega.

Delta Sigma Delta Dental Fraternity.

By Dr. R. H. D. Swing.

Founded in 1883 at Ann Arbor, Mich., in the dental department of the University of Michigan, by Charles W. Howard, L. J. Mitchell, C. J. Hand, E. L. Kern, L. M. James, L. I. Davis, D. D. Magill, William Cleland and C. P. Weinrich, Delta Sigma Delta has the distinction of being the oldest dental fraternity and the third oldest professional fraternity. (Phi Delta Phi law fraternity was founded in 1869 and Nu Sigma Nu medical fraternity in 1882.)

Delta Sigma Delta consists of a supreme chapter, a supreme council, auxiliary chapters, a council of deputies and subordinate chapters. The supreme chapter membership includes those practitioners of dentistry who have been elected and initiated direct from the profession and those who have been "raised" from subordinate chapters. The auxiliary chapters are local branches of the supreme chapter, and they are designated by the name of the city or state in which they are located.

Subordinate chapters are undergraduate organizations and are designated by the letters of the Greek alphabet. Subordinate chapters are confined to dental schools of the highest standing only. In Delta Sigma Delta there is no provision for honorary membership; all members are active.

The governing power of the fraternity is vested in the supreme chapter, which meets annually. During the interval between annual meetings the governing power, with certain restrictions, is vested in the supreme council. The six highest officers of the supreme chapter constitute the supreme council. The fraternity publishes a quarterly organ, *Desmos*.

The object of the fraternity is "To elevate the morale and tone of the practice of dentistry among its members. The uplifting of dentistry by inculcating in the minds of the student body and of graduates a spirit of fraternal coöperation toward scientific, ethical and professional progress."

Xi Psi Phi Dental Fraternity.

By Dr. H. B. Pinney.

This fraternity was founded at Ann Arbor, Mich., on February 8, 1889. The members attending this meeting were L. C. Thayer, W. E. Gary, G. G. McCoy, E. Waterloo, W. H. Booth and A. A. Deyoe. A second meeting was called early in April of the same year and freshman, junior and senior, with one united effort, ushered into existence the Xi Psi Phi Fraternity, which today has a membership of approximately 10,000.

The name given the organization at its founding was Delta Beta Gamma, these letters signifying "Dental Brothers' Guild," but this name was later changed to Xi Psi Phi and the motto adopted was "Even-handed Life Clan." In May, 1892, we find recorded in the office of the Secretary of the State of Michigan articles of association of Alpha Chapter, Xi Psi Phi Fraternity. This, then, marks the advent of our organization into the field of national Greek letter societies.

The first subordinate chapter to be organized was Delta Chapter, February 21, 1893, at the Baltimore College of Dental Surgery, and four other chapters followed in quick succession. The supreme chapter was organized and its first meeting was held in Buffalo, June 16, 1901. A new board of

directors was elected and petition made by them for a legal incorporation in the state of Illinois, which was granted February 6, 1906. The reorganization of the fraternity along the new lines necessitated another revision of its laws, and for the fourth time the constitution was entirely revised and adopted.

In all thirty-eight chapters have been granted charters, but for some reason or other only twenty-seven are active. There are also eighteen active alumni organizations.

Psi Omega Dental Fraternity.

By Dr. H. E. Friesell.

The Psi Omega Fraternity was organized at the Baltimore College of Dental Surgery June 8, 1892. The fraternity aims to elevate the standards of the profession and to encourage scientific investigation and literary culture.

From a membership role of 200 in 1895, Psi Omega has grown until, in 1920, it numbered forty-five active chapters, forty-two alumni chapters and more than 13,000 members distributed in every part of the United States and Canada, and in several foreign countries. Though it is third in age it is the largest of the dental fraternities.

The government of the fraternity is through a triennial convention called the grand chapter, with a recess administration by a board of officers called a supreme council.

The fraternity publishes a quarterly journal entitled the *Frater*, which is edited by Dr. Alfred P. Lee, of Philadelphia, and is regularly sent to every member.

Alpha Omega Dental Fraternity.

By Dr. S. H. Bomenblitt.

The Alpha Omega Dental Fraternity was organized in Baltimore, at the University of Maryland, December 7, 1909. At this time it was a local fraternity, but on Decem-

ber 20, 1909, it affiliated with the Ramach, a local fraternity of Philadelphia, which had been organized at the old Pennsylvania College of Dental Surgery, now out of existence. These two local fraternities amalgamated and were incorporated December 22, 1909, as a national fraternity, the Alpha Omega Dental Fraternity.

The membership is approximately 2000 with fifteen active chapters situated in schools of the highest standing throughout the United States. There are two chapters that have been forced to become inactive, due to the closing of the schools at the Medico-Chirurgical College and the New Jersey Dental College.

The society's publication is called the *Alpha Omegan* and is issued quarterly, the publication headquarters being at Baltimore, Md.

The purposes of the organization are outlined in the preamble to the constitution: "Friendship, brotherhood and mutual aid; to uphold the highest standards of the profession; provide for ourselves the pleasures of universal brotherhood; and promote our general welfare."

Only such men are admitted into our fraternity as are of the highest moral character and have a high scholastic standing. The principles of equality, justice and fair dealing are inculcated.

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